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TRANSACTIONS

OF THE

ROYAL SCOTTISH ARBORICULTURAL SOCIETY.

SECRETARY AND TREASURER,
ROBERT GALLOWAY.

VOL. XIV.

EDINBURGH:
PRINTED FOR THE SOCIETY.
SOLD BY DOUGLAS & FOULIS, CASTLE STREET.
1895.

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The Society, as a body, is not to be considered responsible for any statements or opinions advanced in the several papers, which must rest entirely on the authority of the respective authors.

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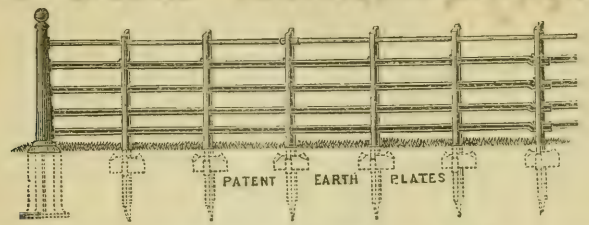

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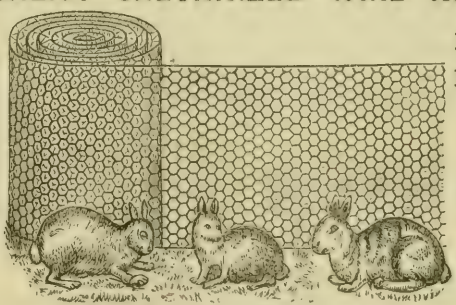

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TRANSACTIONS

OF THE

ROYAL

SCOTTISH ARBORICULTURAL SOCIETY.

VOL. XIV.—PART I.

SECRETARY AND TREASURER,
WILLIAM J. MOFFAT,
FELLOW OF THE BOTANICAL SOCIETY, EDINBURGH.

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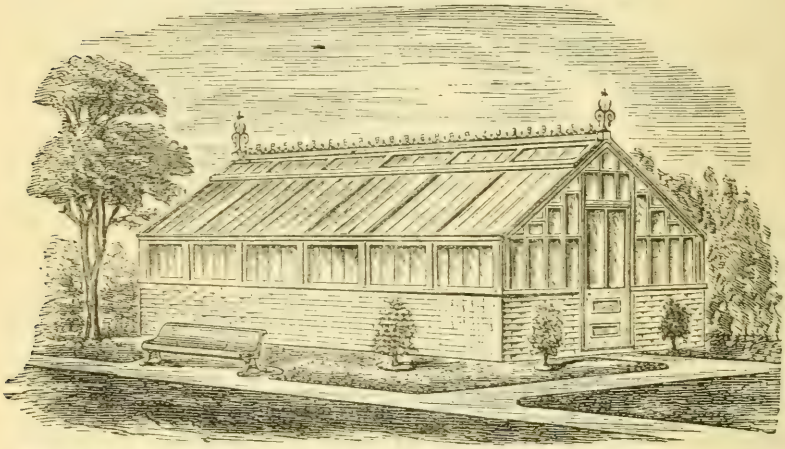

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Gentlemen,—I confess to a feeling of diffidence in rising to address you from this Chair to-day, inasmuch as I am disposed to call in question, in the interests of this and indeed of any society, the policy of retaining, for a lengthened period, one individual in the President's Chair; and I cannot but think that, in now for the fourth time choosing me to preside over your meetings, the limit to which such continuity of office is wise has been more than reached. I am fully sensible of your kindness, and I beg you will accept the warm expression of my appreciation of the honour you do me in again electing me to the Chair, and receive my acknowledgments of your continued confidence. I can only give you again my assurance that I shall endeavour, as far as is within my power, to promote the aims of the Society, and the progress of the science to which it is devoted.

I have been reminded, by those who are responsible for the arrangements connected with the Excursion, that the hour of starting necessitates our proceedings here being of short duration, —a gentle hint, I take it, that I should be brief in any remarks I make to you now, and I will therefore endeavour, in as small a compass as possible, to touch upon several topics concerning our work during the past year which I desire to bring before you.

It is my pleasing duty, first of all, to inform you that the Society is in a most prosperous condition. Last year I was able

to congratulate you on a record year in the way of accession of new members, but this year we have again beaten the record. The Secretary tells me that no less than 85 new members have joined us, and the Society now numbers 600 active members, drawn from all classes in the realm. I say active members, measuring activity by the practical test of payment of the dues it is needful to levy for our administration; for you must remember that it would not be difficult to have a paper strength of greater amount, were our officers not vigilant in weeding out those, of whom it is inevitable there should be some, whose ardour in the cause has cooled to a degree that has closed the mouths of their pockets.

And whilst we contemplate with satisfaction this increase in our membership, we have also to deplore losses from our ranks, and amongst those who have fallen since last we gathered for our annual meeting, I will mention one who, a member of the Society for twenty years, successfully managed, for I dare not say how long, an acreage of woodland one of the most extensive estates in the country, a portion of which we had the advantage of visiting a couple of years ago in our excursion to the south-west of Scotland. By the death of Mr Fingland, forester to the Duke of Buccleuch at Drumlanrig, a well-known member is lost to our Society. I am not sufficiently conversant with his work to speak of it to useful purpose; but I feel, as I have on a former occasion said, when a veteran goes from us ripe in experience, that we are at once cut off from so vast an amount of practical knowledge of facts bearing upon our science, and of historical interest, that I cannot but wish some means could be devised for recording them ere they are beyond recall.

It is not, however, by its numerical strength alone that the prosperity of our Society is to be estimated. This proves how the Society has taken hold in the country, that its aims and work are recognised as being of importance immediately to a very extended community, and ultimately to the whole nation. Membership gives the Society its backbone. The other test of our prosperity, at which I have hinted, is the success which attends our efforts to promote the cause of forestry in the country, and I have very gratifying evidence to bring before you to-day, illustrating the powerful influence which an earnest body, as this is, knowing clearly what is required and what ought to be done, may exercise for the good of the country.

Many of you may remember that in his introductory address to the Forestry Class in the University, Colonel Bailey referred to the startling fact that, in specifications issued by the Board of Agriculture with reference to works to be executed under the Land Improvement Act, the use of home-grown timber was not allowed, without special permission. Colonel Bailey most properly criticised and condemned this restriction as a slur on the proprietors of forests of this country. The wording of the specification, as given by Colonel Bailey in course of a correspondence in the *Scotsman*, provoked by his exposure of the fact, is:—"In all cases where fir timber is used, that obtained from Memel or Riga, and battens from Dram, St Petersburg, or other Norway or Baltic ports, is to be preferred, but if not procurable, the best quality of American red pine only may be substituted; or, if specially allowed by the Board, larch or 'home-grown' fir may be used, if thoroughly sound and well seasoned, in which case the age, size, and growth of the trees must always be specified." The matter came before your Council at its meeting in November last, when the following letter from Mr Munro Ferguson was read, and the correspondence quoted ensued:—

RAITH, KIRKCALDY, N.B.,
15th November 1892.

DEAR SIR,—The Lecturer on Forestry at the University of Edinburgh has commented, none too severely, upon the practice of the Board of Agriculture in framing its conditions of contract so as to prohibit the use of home timber. But this Board is not the only sinner. Two or three weeks previously, a wood-merchant handed me a post-office form of tender for telegraph poles, which entirely cut out any native products from the competition. I wrote to the authorities, who showed the utmost readiness to look more closely into the matter.

This exclusion of home timber from contracts is the common practice of architects and others, and has been gradually established owing to the importation of prepared timber in bulk, and because the use of it may save a certain amount of trouble.

We home growers may be remiss as to the manner we sometimes place our wood upon the market, but I know of nothing to justify our exclusion from free competition, and of nothing to make us afraid of it. I much regret being unable to attend to-morrow to ascertain whether it be the view of other members that the matter should be taken up by the Society.—Believe me, yours truly,

R. MUNRO FERGUSON.

W. J. MOFFAT, Esq.

5 St Andrew Square,
Edinburgh, *8th March* 1893.

Dear Sir,—I submitted your letter of the 15th November last to a meeting of the Council held on the 1st curt., and have been requested to make the following observations thereon. The clause in the specifications of the Board of Agriculture, with reference to the timber to be used in buildings in Scotland, reads as follows:—

> "*Timber.*—In all cases where fir timber is used, it shall be the best of its kind, and well-seasoned,—that obtained from Memel or Riga, and battens from Dram, St Petersburg, or other Norway or Baltic ports, is to be preferred, but if not procurable, the best quality of American red pine only may be substituted; or, if specially allowed by the Commissioners, larch or 'home-grown fir' may be used, if thoroughly sound and well seasoned, in which case the age, size, and growth of the trees must always be specified."

The Council are not aware of any reasons why such restrictions should be placed on the use of timber of home growth, especially for roofing purposes, as it is well known that such can be obtained of an equal lasting quality to any that is imported, and for couples, with the exception of pitch pine, none is equal to home-grown larch. In these specifications, home-grown timber, if it should not receive a preference, ought at least to be placed on a footing equal to that specified for foreign. Were that done, stocks would be created which could, it is believed, be placed on the market on as favourable terms, and of as good a lasting quality, as any imported.

If the clause quoted above were made to read as follows, it would satisfy all requirements:—"In all cases where fir timber is used, it shall be the best of its kind, and well-seasoned. Home-grown timber to be cut from sound trees of suitable dimensions. Where imported timber is to be used, that obtained from Memel or Riga, and battens from Dram, St Petersburg, or other Norway or Baltic ports, is to be preferred, but if not procurable, the best quality of American red pine only may be substituted."

The Council are at a loss for the reasons why home timber should be excluded from Government contracts, and they feel that instead of giving the cold shoulder to the industries connected with the growth and manufacture of timber, the Government should be the first to encourage and foster them in every way possible, even by preferring timber of home growth, wherever it is suitable, to that of foreign.

The postal authorities use imported timber for their telegraph poles, which, after being dressed, are creosoted. Importations of *Pinus sylvestris* for that purpose, before being dressed, have been examined by experts, and they report that *Pinus sylvestris*

of home growth is quite equal, if not superior, in growth and quality to the foreign, and, owing to its texture, it is more capable of being thoroughly creosoted.

Were questions on the points mentioned put to the Minister of Agriculture and the Postmaster-General, the reasons for the absurd restrictions placed on home-grown timber might be made known.

The foregoing statement was drafted by a Committee of the Council, and I trust it may be the means of righting what apparently is a great wrong.—I am, yours faithfully,

W. J. MOFFAT, *Secretary*.

R. MUNRO FERGUSON, Esq. of Raith and Novar.

46 CADOGAN SQUARE,
11*th March* 1893.

DEAR SIR,—I am directed by Mr Munro Ferguson to thank you for your letter. He will forward it to the Postmaster-General and the Minister of Agriculture.—I am, yours faithfully,

J. S. SMART.

W. J. MOFFAT, Esq.

46 CADOGAN SQUARE,
15*th April* 1893.

DEAR SIR,—I am desired by Mr Munro Ferguson to send you the enclosed communication from the Board of Agriculture.—Yours faithfully, J. S. SMART.

BOARD OF AGRICULTURE,
3 ST JAMES'S SQUARE, LONDON, S.W.,
12*th April* 1893.

SIR,—I am directed by the Board of Agriculture to inform you that they have had under their consideration the letter from the Royal Scottish Arboricultural Society, which was forwarded to the President with Mr J. S. Smart's note of the 16th ultimo. The paragraph quoted in that letter is not taken from the Minute and Specifications now issued by the Board, with reference to works to be executed in Scotland under the Lands Improvement Acts, as will be seen from the enclosed copy of the printed Minute; but the Board are disposed to think that even the modified wording of the existing specifications is to some extent open to the criticism urged by the Society, and they propose to adopt the following paragraph in lieu of the present one:—

"Where fir timber is proposed to be used, the specifications must state whether such timber is to be 'home-grown' or imported. In the former case, the timber must be cut from sound trees of suitable dimensions, and the age and size of the trees, and the date of cutting, must be stated. Where imported timber is to be used, that obtained from Memel or Norway, and battens from

Dram, St Petersburg, or other Norway or Baltic ports, is to be preferred, but if not procurable, the best quality of American red pine only may be substituted. In either case, the use of any particular description is subject to the approval of the Board."

The Board think that the new wording proposed will probably meet the views of the Society.

With regard to the specifications for contracts issued by the various public Departments of the State, the Board would suggest that any suggestions which the Society may decide to offer on the subject of the use of home-grown timber, should be brought directly under the notice of those Departments, by whom they will doubtless be fully considered.—I am, Sir, your obedient servant,

JACOB WILSON, *Director.*

R. C. MUNRO FERGUSON, Esq., M.P.

You will observe that the protest of the Society has had effect, and the objectionable limitation respecting home-grown timber has been modified for Scotland, so far as concerns work under control of the Board of Agriculture—a tribute to the usefulness of this Society as representing the voice of forestry interests in Scotland. What may be the nature of the specifications issued by the Board for England and other parts of the United Kingdom I do not know, but it is worth while calling the attention of our offspring, the English Arboricultural Society, to this matter. If the prohibition exists in England, that Society should not be behind the parent Society in pressing for its removal. And our vindication of home forestry with the Board of Agriculture should be for ourselves only a first step in this matter. The Board of Agriculture rightly refuses to interfere with the work of other Departments of Government, and our clear duty now is to follow up what we have already done by a rigorous inquiry into the forms of specification issued by all other Public Departments involving use of timber, so that we may altogether remove the stigma which has become attached to our home products. In the immediate case with which we have dealt, we cannot but commend the zeal with which Mr Munro Ferguson has acted in the matter, and thank him for his active co-operation.

One other and less satisfactory point regarding our procedure during the past year I must allude to. To a successful and influential Society, as to a similarly placed individual, there always attaches the risk of being *exploité,* and I fear that we must consider that—no doubt in very good company—we have given our patronage to an undertaking from which I personally do not

see that much credit can redound to us, nor real advantage to forestry. This is a matter, however, upon which every one who makes the Excursion of the Society will be able on Saturday to form an individual opinion. For myself, I may say that having twice visited the so-called Forestry Exhibition at Earl's Court, once shortly after opening, and again last month, I grieve over the meagre display presented in the name of forestry, and regret that the Society's name should be associated with it. The Exhibition, as every one knows, is essentially a place of entertainment—water show, Bastille, switchback, and so forth,—and as such is doubtless most successful, and supplies a form of amusement for which there is great want in London. But why not call it by its right name? Why should "Forestry" be *exploité* to give a name to the Exhibition? I allude to the matter in this place, because I feel that harm may accrue to the science from such exhibitions. Any one going to the Exhibition with a desire to inform himself upon forestry, its present position, its value, and its prospects, could not but receive, from the objects shown, a wrong impression regarding the importance of the subject; and in these days, when we are so strenuously endeavouring to force the attention of people in the country to the great interests involved in forestry, it is unfortunate that an affair of this kind, calculated to bring our science into contempt, should have developed.

Turning now to educational questions:—When I addressed you last year I was able to announce that the scheme for teaching practical foresters and gardeners in the Royal Botanic Garden would come into operation towards the end of the year, and in conformity with the intention I then expressed, a circular, which had the approval of leading members of Council, was issued in the autumn, —a copy of it will be found appended to my address in last year's part of our *Transactions*. A most gratifying response came, in the form of no less than 67 applications for admission to the course. After sifting the list, and with the co-operation of Edinburgh nurserymen, members of the Society, whose action in this matter I desire most cordially to acknowledge, 44 of the applicants were admitted to the course, some being taken on the staff of the Royal Botanic Garden, some being provided for by nurserymen, and others had or found private employment in Edinburgh.

The course was opened in November, and lectures have been given up till now on Chemistry, Physics, Entomology, Mensuration and Land Surveying, and there has been practical instruction in

Land Surveying and Plan Drawing. The attendance at the classes has been excellent, and the examinations satisfactory all round. Regarding the men themselves, it would not be easy to find anywhere a finer body of men, and every one of the lecturers has been impressed, as much as I myself have been, by their intelligent appreciation of the subjects brought before them, and by their diligent application and endeavour to master details. And if I may judge from what I have heard of the views of the men, they are no less satisfied with the instruction provided than we are with their reception of it.

After the holiday months, from August to November, we shall recommence the course, and, with the promise of support which I have received from various lecturers, I look forward to a fruitful continuance of it.

One pleasing feature of the opening of the course was a communication from General Michael, C.S.I., warmly commending it, and enclosing, as a mark of his sympathy with the movement, a cheque for £10, to be given, at the conclusion of the course, to the man who acquitted himself best in forestry,—a recognition which I need not say was warmly acknowledged, and which will be, I am sure, an additional incentive to the men to study.

The path to success is never, I suppose, smooth, and ours, in this matter, has not been an exception. Before the course was opened an opposition to it cropped up unexpectedly in a quarter to which, so far as I know, none of us have hitherto had reason to look for special interest in forestry matters. What the inwardness of the opposition was I will not stop now to inquire, the avowed and sufficiently absurd reason was an assumed rivalry with the teaching in the University. The matter was dealt with in the *Scotsman*, and I had supposed and hoped its discussion there, and the practical working of our scheme, had given the story of rivalry its quietus. It was therefore with great regret I read in a report in an agricultural paper of a meeting of the Highland and Agricultural Society—a meeting my official duties prevented me attending—that the chairman of the Forestry Committee of the Society had again raised this bogey, and had indulged in some free criticism of our course. Because only one student, who, as it happened, was not a pupil of the Edinburgh University lecturer, appeared for the diploma examination of the society, and obtained only a second class, therefore our course at the Botanic Garden was opposed to the University teaching. This

was in effect the argument, supplemented by the statement that our teachers are not recognised, upon which Sir Robert Menzies based a demand for the stoppage of our course. I don't know what is Sir Robert Menzies's idea of a recognised lecturer, but as Colonel Bailey, the University lecturer, in whose interest Sir Robert Menzies apparently believed he was speaking when he made this attack upon us, has kindly undertaken to lecture to our men on forestry, I must suppose that Colonel Bailey only speaks with authority from his official chair. I can pass by the suggestion of our rivalry with the University with a reference to previous utterances, and to the discussion in the *Scotsman*. I have hesitated to say anything about this matter to-day, because I hate such disputations, and the criticism of our work being so absurd and inconsequential, anyone in the smallest degree acquainted with the facts would see that the statement carried its own refutation; but as I had to allude to the carrying on of our course, I felt that expressions regarding it, used by one in so prominent a position as the chairman of the Forestry Committee of the Highland and Agricultural Society, might be accepted by those not conversant with the circumstances were I to pass them by without some protest. I must think it unfortunate that reckless assertions of this kind, which are not calculated in the least to promote the cause of forestry, should be made by those professedly speaking in its support.

With reference now to University education (which I speak of after dealing with our garden course, because it leads up to a suggestion with which I shall conclude my remarks to-day), the past year has not been uneventful. Forestry has been assigned a place in the University curriculum for the degree of Batchelor of Science in Agriculture. The ordinance of the Commissioners regulating the degree in agriculture has now come into force, and though forestry is only an optional subject, we must be thankful, on the principle that half a loaf is better than no bread, that so much has been gained. With the realisation of the importance of forestry, further recognition of its right place will come.

The University lecturer, Colonel Bailey, has vigorously carried on the course of lectures in the University, having an attendance of 13 students,—an increase on the preceding year, and a fairly-sized class for a subject not compulsory in a curriculum. He has kindly supplied me with information regarding his men, from which it appears that land agents and men of such status,

whom it was expected would take advantage of such a class, are just those who attend.

Under the new ordinances of the Commissioners for the establishment of Boards of Studies, the forestry lecturer will, in the future, have a more intimate connection with University affairs than was possible under the old statute, but I need not tell you that the realisation of our hopes of a professorship foundation ought alone to satisfy our aspirations for the future of our science.

And this leads me to the last point upon which I desire to say a word or two to you to-day. The mention of our contemplated professorship will naturally raise the question,—What of the Endowment Fund? How is it getting on? I see the Secretary will afterwards make a statement thereanent, and I shall not, therefore, forestall him further than in expressing a fear that the account he will give us is not a very rosy one. We must confess it is a little disappointing that after those several years of effort, the endowment at which we aim is not nearly reached. It is a misfortune that our landed proprietors do not see their interest in the direction to which we point, but we cannot compel to contribute men who do not see their way to do so of their own will, and unquestionably the general circumstances of the times are not such as to favour the accumulation of such a fund as we seek to establish. But disappointment to the members of this Society who have laboured so long, and who are now beginning to achieve, is not discouragement; and I have no doubt about an ultimate success.

But possessed with this feeling, I am none the less awake to the circumstances of the hour, and I have put it to myself whether there is no other way by which we could gain a more advanced position towards our goal, which would enable us better at present to do what we realise as needful in our cause, and which would, at the same time, favour our prospects of securing what we desire. I think there is, and in the few minutes more I would ask you to allow me to detain you, I will briefly state a suggestion which I venture to think is not too chimerical for consideration, nor too ambitious for realisation.

Technical education in our day is no longer the vague expression it was within the memory of many of those here present, covering the general exposition of the application of scientific method to arts and manufactures. It has passed far beyond that to the stage of specialisation, and it is, or ought to be, the aim of all those

in whose power the regulation of such education is entrusted, so to foster it that it shall most efficiently supply the needs of the population in whose midst it is established, and that cognate subjects with a common foundation be taught in combination. Now, here in Edinburgh, we may claim to be a great horticultural centre, and when we look at arboriculture and sylviculture—at forestry—one has to remember that the scientific principles we desire to inculcate in those who are to practise the art as a science, are fundamentally those which are required for men who purpose to devote their lives to horticulture, and that in a great many features the work of the agriculturist is founded on similar essentials. Thus, three practical subjects then, Agriculture, Horticulture, and Forestry, form a group which by a well-organised equipment, might in their fundamental principles be taught in one school. When I look around me, in and about Edinburgh, I see that already there are agencies through which, in a greater or less degree, such teaching is provided for, and carried out. Such endowed institutions as the University, the Royal Veterinary College, and the Heriot-Watt College spend money on such objects, and there are benevolent fountains supplying revenues for this purpose—the Board of Agriculture, the Town Council, and the County Councils; and, in addition to the three endowed institutions already specified, the Scottish Horticultural Association, the new Incorporated School of Agricultural Science, the Royal Botanic Garden, are agencies through which some of this money is expended; whilst the Highland and Agricultural Society and New Veterinary College are engaged independently upon work of a similar kind.

Now, although it is an advantage to be able to dip into many purses for the wherewithal for carrying on any sound system of education, the multiplication of unregulated and unconnected outlets must result in a maximum of expenditure, without a maximum of result, inasmuch as overlapping in the work performed is inevitable; and it being manifestly disadvantageous to have such a dissipation of means to an end, as I have pointed out exists in Edinburgh, the question I ask is this,—Is there no way by which some concentration can be brought about? Can we not devise some method of combination of forces? I confess when I hear of and note the good work that is being done by co-operative effort, in such an institution as the Science College of Newcastle-on-Tyne—part of the University of Durham—which stole from us

Professor Somerville,—I sigh for the time when we here in Edinburgh shall have combined our energies, and in a similar, even more extended college, carry on with effect, and at minimum cost, education in the subjects I have mentioned.

Is that time to be always in the future? Is the time not come now? Is it not possible for us to have now, in Edinburgh, a college representative of Agriculture, Horticulture, and Forestry—a College of Rural Economy?

I believe the thing is possible, and I think the time is come when an endeavour may, with some prospect of success, be made to accomplish the object. There are, of course, difficulties to be overcome, but I cannot think they are insurmountable. I mention the subject to you to-day because, were the idea realised, our forestry teaching would be influenced, and the question of horticultural education is also involved, and this audience, comprising so many who are interested in both these branches of science, appears to me to be therefore specially fitted to discuss the matter with appreciation of the issue.

How then, you may ask, do I suggest that this concentration should be developed, and the college I speak of be established?

What we want to get is a channel through which such public moneys as are now, or may in future become, available for such education, from whatever source they come, may be applied upon a definite and coherent system. Now with regard to the bodies from whom such moneys come at present—it is an open secret that the Board of Agriculture views with disfavour the sporadic doles it makes just now, and would be glad if some means could be arranged through which its contributions for education in this district should pass to a central representative body; and I do not suppose the Town Council or the County Councils would be one whit less disposed to contribute to the cause of education when it is better organised, than they are now, and I think we may therefore assume that on the creation of a central school of teaching, the money which has hitherto flowed in diverse channels for this kind of education would not be diverted from the subject, rather, I would contemplate, a more lavish expenditure upon them.

It appears to me that this utilisation of existing endowed institutions would be the simplest and the right method of procedure. When I look back on the history of our University, and remember that the noble institution we have at the present day took origin from the town, the Town's College, and from supplying

a local, has now come to supply the world's need, I ask, is it not possible that the Town Council, acting with characteristic liberal spirit, may give us the college I suggest? I think it is possible. The foundation of it appears to me to be already laid. We know that the Town Council is the Patron and Trustee of the Royal Veterinary College, and is therefore specially interested in that Institution, which has not yet, I believe, come into full use of its endowment. Is not this the college that should be utilsed as a centre around which a representative technical college could be built up? Under the new ordinances of the University, it would be possible to affiliate the Royal Veterinary College, and thus make it an integral part of the University, and the basis of the Rural Economy College I have spoken of under the ægis of the University and the Town Council. To this Institution the various contributions for this special education could be assigned, and the staff could be increased to meet the requirements of the time.

I cannot enter into the many details of arrangement which the suggestion involves. I would merely add that there appear no difficulties that could not be got over. It might be well, perhaps, that in the governing body of such a college the three societies representing the branches of science to be taught should have some representation—the Highland and Agricultural Society, the Scottish Horticultural Association, and the Royal Scottish Arboricultural Society. Then it would be necessary to have evening as well as day classes, to meet the needs of practical workers. There should be a curriculum of study. There should be some form of certificate or diploma to be awarded as a mark of merit to those who satisfactorily acquitted themselves throughout the curriculum. These and many other points would require careful consideration, but I cannot but think that in this direction is to be found a satisfactory solution of the difficulty that confronts us at present, the inharmonious diffusion of public moneys available for the teaching of these important subjects. So far as our forestry teaching is concerned,—which was the theme through which I have been led to make the suggestion just stated,—we should make a distinct advance. The subject would be established in a definite position, side by side with agriculture and horticulture, as a recognised part of University education. We should have a definite curriculum for foresters as well as one for agriculturists and gardeners with adequate teaching in the fundamental sciences, and the interest in the subjects which such a technical college of

the University would arouse could not but lead to further developments, through which we should attain to a full realisation of our hopes.

And now, gentlemen, I have done, and you will all be eager to get off upon the extremely interesting Excursion that has been arranged. One thing in connection with it remains for me to say. You will remember the cordial reception accorded to the Society last year by Mr Edward Balfour, younger of Balbirnie. This year Mr Balfour is not able to join the Excursion as he had wished, but shows his and Mrs Balfour's interest in our proceedings in the very practical way of an enclosure to the Secretary of a cheque for £11, 19s., to pay the expenses of the Excursion for two cadet foresters, members of the Society. Your Council have carried out Mr Balfour's intention in this way. The forester who has done best in the classes at the Royal Botanic Garden, and who was qualified as a member of the Society—John F. Annand—has been selected in the first instance as one of the two to go under this gift, and for the second place a ballot was taken, with the result that William Forgan, a young forester at Lynedoch, on the Scone estates, has been chosen. I need not tell you that your Council passed a special vote of thanks to Mr and Mrs Balfour for their generosity, and I am sure you will all heartily concur in that vote. It appears to me that this example is one which other proprietors might well follow, not necessarily acting through the Society, but sending young men from their own estates, for the small outlay involved in sending a young forester on these instructive excursions would be more than repaid by the increased interest he would assuredly take in forestry, and by the improvement which contact with experienced men necessarily brings with it to an intelligent mind.

II. *A Brief History of the Arboriculture of the New Forest, Hampshire.* By the Hon. GERALD LASCELLES, Deputy Surveyor, New Forest.

I do not propose in this paper to enter at length into the origin and formation of the New Forest. We have all learnt at school the legend of the devastation of a vast tract of fertile land—the destruction of many churches and villages—by the ruthless Conqueror, in order to form a Chase where he might enforce the savage forest law for the preservation of "the tall deer which he loved as if he had been their father," to quote the ancient chronicles. I say "legend" advisedly, for it is perfectly clear to all who have seen the district in question, and to the most elementary student of geology, that at no period could the New Forest have been a fertile plain, or have nourished the population which the Conqueror obtained the credit of evicting.

The ancient name of the Forest was "Ytene," a Saxon word signifying the "furzy waste," and this was probably a good description then, as now, of the Forest. There is some evidence of its having been used as a Royal Forest in the days of Canute, A.D. 1017; and what really happened after the Conquest in 1066 was, that William selected this wild tract as a suitable hunting ground for himself, within easy reach of his capital city of Winchester, and enforced the forest law within its boundaries, thereby reserving the exclusive right of sporting for himself. Further than this it is not probable that he went, and men retained possession of their lands, their woods, mills, or other property, just as before, save only for the stringent regulations of the forest law. Of actual arboriculture there is not much trace at this remote date, except in so far as the rigid laws of the forest with regard to "vert and venison" served to protect all manner of trees or shrubs under the head of "vert," since, "to preserve well the venison of the forest, it is first to begin with the vert."[1] Vert was of two kinds: "Over vert," or Haut Bois, and "Neather vert," or Sous Bois; the first comprised every description of timber tree, or "great wood" as it was termed; the latter, every kind of shrub or bush, such as underwood, gorse, thorns, or anything that afforded covert for the beasts of the forest—even fern and heath were by some

[1] See Manwood's "Treatise of the Lawes of the Forrest."

accounted vert. Under the prevailing law it was not lawful for a man to cut so much as a stick in his own woods within the regard of the forest, except "by view and allowance of the foresters."

These restrictions would no doubt have the effect of strictly preserving the existing trees and shrubs, but it would do nothing towards replenishing them, when, in the natural course of events, they decayed and perished. Moreover, in so barren and bleak a tract, the greater part of which is altogether unsuitable for the growth of timber, it is probable that the amount of wood was small, compared with the present day. The present Forest comprises in all a tract of 92,395 acres. Of this, 27,658 acres are private property, enclosed and cultivated, and are not a part of the public estate. The statistics of the Forest are as follows:—

	Acres.
Open heath and pasture, ...	40,478
Open lands with timber, ...	4,500
Plantations enclosed, ...	11,138
,, open, ...	6,532
Freehold and copyhold of the Crown, . .	2,089
Private property and encroachments, . .	27,658
	92,395

Under the head of plantations, nothing is included of an earlier date than those which were planted under the Act 9 and 10 William III., that being the first date at which the plantations were enclosed under a Commission, which caused them to be properly "butted and bounded," and made returns thereof to the Treasury. As we shall presently see, there were innumerable plantations made previous to that date, but what is left of them has either been absorbed into more modern plantations, or else is included under the head of "open lands with timber."

The plantations subsequent to the year 1700 are divided thus—

	Acres.
More than 100 years old, . . .	1377
From 75 to 100 ,, . . .	2230
,, 50 to 75 ,, . . .	4080
,, 25 to 50 ,, . . .	4278
Under 25 ,, . . .	5705

Of the Crown freeholds, about one-half are cultivated land, and the other half—say 1000 acres—is under oak plantation of about

sixty years' growth. The remainder, of say 63,000 acres, may be termed the forest proper—the property of the nation in right of the Crown, subject, as to certain parts, to the rights of private individuals, termed "rights of common."

Of this 63,000 acres, about 30,000 acres was described in 1849, by one of the most eminent firms of land agents in this country, as being "unfit for either agriculture, growth of timber, or pasturage." If this description was applicable at that date, it is infinitely more so now, when prices for all kinds of farm and forest produce are at their lowest ebb.

Of the remainder, 4500 acres is occupied by old woods planted prior to the year 1700, 17,670 acres are under plantations of dates varying from 190 to 25 years of age, and the balance of 11,000 acres or so is devoted to rough pasture.

With this brief description of the condition of the New Forest as it was, and as it is, we may proceed to examine what has been done, and is being done, in the way of arboriculture past and present.

As has been stated before, the forest laws did something for the preservation of the crop of timber actually on the ground, but did nothing towards reproducing it, when by natural decay it perished. That encoppicements, and even plantations, were made seems probable, because the preamble to the first statute passed upon the subject—that of the 22 Edward IV., in A.D. 1483—refers to the restrictions placed upon planting by the forest laws, which regarded the preservation of game as the foremost consideration. But by subsequent statutes—those of the 35 Henry VIII., and 13 Elizabeth, the practices of encoppicing were made imperative in the royal forests, and many orders and proclamations were made in accordance with them.

The records of the Court of Exchequer abound with memoranda of the cost of erecting fences for the exclusion of the cattle and deer from the various copses or woods in different parts of the forest, commencing with the reign of Henry VIII. In the seventh year of Elizabeth we have a return of "all Her Majesty's woods in parks, forests, and chases," in which is given a most complete list of the ancient woods of the New Forest, some of which can be traced at the present day, though in most cases the sites, being land well suited to the growth of timber, have been replanted with younger wood at some intermediate period. But

there is hardly an acre of land which would grow timber naturally that is not referred to in this return.

The practice of cultivation seems to have been that of "natural regeneration," such as is advocated by the most distinguished foresters of the modern school. In old days it went by the name of "encoppicing," and the process seems to have been simply to enclose the area by a fence against cattle and deer, and to rely on the natural reproduction of the seed from the existing crop of trees to replenish the wood. After the coppice was fairly established, it seems to have been the practice to farm it out on lease for a term of years, but under certain restrictions as to the preservation of the timber. Thus in A.D. 1571 we find a presentment of the regarders of the forest to the effect that "a coppice called Ridley Coppice hath been spoiled by cattle by one John Marlowe." To this careful attention, it may be, we owe it, that we are now able to enjoy the beauties of Ridley Wood—without exception the most beautiful of all the woods of the New Forest as it now exists. Such presentments, however, abound in the records of this reign, and it is clear that great pains were taken to keep the numerous young coppices free from all manner of cattle. These coppices are the old woods, which are the glory of the Forest at the present day.

The leasing to which I have referred seems to have extended only to underwood, for in the presentments against those who were the tenants, are indictments "for felling five dotards containing ten loads of timber, value 6s.;" for "shrouding (or lopping) 200 trees in the said coppice and selling the same;" again, "for divers and many young oaks felled for stakes for the hedge" (this also in the same Ridley Wood, which seems most fortunately to have been a special object of care). Last, and perhaps worst offence of all, "the regarders and preservators of the Bailiwick of Fritham make oath and say in English words—that in the coppice called Hocknold there is felled *by the ground* four oaks." These records, trivial as they may seem, when taken with the story that the old woods tell for themselves, throw a flood of light on the origin of the most ancient of the woods we now behold. That they were first enclosed is certain from the heavy bills we find being presented to the Exchequer of the day for the charges of doing the work; that they were farmed out is shown by the leases and grants to the various tenants; how they were

farmed we have to glean from the complaints as to breaches of contract; that the underwood was regularly cut, either by the tenant or by the Crown, is shown by the receipts for sales of this kind. All timber seems to have been taken for the navy. But the presentment as to the "shrouding" of trees, and as to cutting of certain (four) oaks "by the ground," shows, if the woods themselves did not tell the tale, that pollarding the timber trees was a common practice. Thus in Mark Ash, perhaps one of the oldest of the beech woods, we find every other tree a pollard, which alone shows that the wood has from its earliest days been under cultivation. The same thing will be found in all of the grandest old woods; and in the case of Ridley Wood we have the actual facts of its cultivation, and of the abuse of that cultivation, put upon record.

As this paper will be read by those who are far more skilled in forestry than myself, and as I know that Burnham Beeches will have come under their observation, I would ask them to consider, having such examples as that picturesque old wood and of Mark Ash, as well as Ridley, Bratley, and other New Forest woods of the same date, before their eyes, What is really the effect of pollarding upon our finest forest trees? Is it not the case that the finest specimens of old forest scenery, as regards beech at any rate, are pollards? Is not the "Knightwood Oak" in the New Forest an undoubted pollard? Would these trees have attained to their present age in a healthy condition if they had not—for no motive connected with arboriculture—been thus pollarded in early youth? And lastly, can any experienced member of your Society tell us, approximately, what addition to the life of a tree may be given by this process and check in its youth?

To return, however, to my subject. It does not seem certain whether in the Elizabethan days the foresters relied wholly on natural reproduction for their crop, or whether they also did some planting or sowing of seed. As the coppices were brought regularly under cultivation, it seems probable that they did plant or sow, especially in those cases where the woods were farmed out and the tenant had to make as good a profit as he could in a fixed term. It is hardly probable that so dense a wood as is found in Mark Ash or Ridley would be achieved by the self-sown timber over so large an area, and be all of the same age; such timber would vary somewhat

in age, and these woods do not. In the catalogue of the woods made in the year 1565, the expression, in the description of each wood, frequently occurs of "set" with oak or beech, as the case may be; and this seems to indicate that the crop was not wholly natural. However, as the woods were mostly enclosed, cultivated, cut, and farmed in rotation, there is nothing very extraordinary in their being, to some extent, planted as well, although it would seem that the self-sown crop was mainly relied upon.

From what I have said, it will be clear that those who point to the New Forest as a specimen of "primeval forest, untouched by the hand of man," are sadly out of their reckoning. It is always a pity to destroy a charming and poetical vision, but alas, the rude logic of facts is too much for this pretty theory. It is clear that the cultivation of the trees and woods of the forest was undertaken some time prior to the reign of Edward IV., say four hundred and fifty years ago. Now I suppose I shall not be very far wrong if I put the life of a beech at three hundred years; and though oaks, no doubt, live far longer, yet in the poor soil of the New Forest their lives do not attain to the average, except in a few favoured spots. It is our beeches that are the glory of the oldest woods, and it is very unlikely that any of those we now see are of older date than the records of the Exchequer in the time of Elizabeth, which I have quoted, at which period the forest was as much under a system of enclosing for planting as ever it has been since. In fact, there is not a single one of the beautiful old woods of the Forest that was not just as much a "Crown enclosure" as the most recent of the plantations made under the most recent Act.

To those who are more familiar with the woods of the Forest than it is possible for visitors who have but a short time at their disposal to become, another fact points strongly to the presence of careful cultivation in the earlier days of the coppices. While the greater portion of these woods are of beech with a sprinkling of oak, precisely such an intermixture as we see springing up now wherever there is a bare portion of good land among the parent trees, by some means protected from cattle, yet there are several woods that are almost exclusively oak—one is absolutely so, and it is among the finest of the woods of that date. It is not difficult to account for the absence of oaks among the beeches, by the fact that these woods have been so often searched over by purveyors to the

navy, who have stripped them of the fine oaks suitable for ship-building. But this will not account for the total absence of beech from among the oaks of some of the woods, and as we know from daily observation that that is not the mode in which self-sown woods will spring up in this district if left to themselves, it is impossible to resist the conviction that in certain cases great care was taken either to plant or to sow (probably the latter) oak alone, or else to eradicate the beech that spontaneously sprang up with it. In either case, the hand of man is clear, and the theory of the "primeval forest" becomes untenable.

Like most of his countrymen, James the First of England, the Sixth of Scotland, was a careful forester. Much attention was paid to the New Forest in his reign. In addition to a survey of all trees fit for timber which he caused to be made, to which allusion will be made later, strict regulations were made both for the management of the coppices and plantations, which, with an eye to the main chance, the king was careful to farm out to the best advantage, and also for the preservation of the young timber trees springing up among them. Among the orders, we find the first definite mention of "ploughing of the land for raising of new woods," and this is naturally followed by an account of the cost of gathering acorns, and of that of planting them "by men's hands," which would seem to indicate some method of dibbling. Great stress is laid upon the necessity of keeping the coppices well fenced from cattle and deer, and it would seem that in these ancient days more care was taken to exclude all cattle from the enclosures than is admitted to be necessary now—by the owners of the cattle at least! A proclamation issued in the sixth year of James I., after setting forth that "great spoils and devastations are committed within our forests, parks, and chases" . . . "we therefore have endeavoured to take course to stop the said abuses, and to work the means not only of the better preservation of our said woods in time to come, but of a present multiplication and increase of wood to all ages, and to the end that our care may appear to the preservation and increase of timber as well to others as to ourselves . . . we do straightly command and charge all our loving subjects in general that *in their own woods* they presume not hereafter to defraud the true meaning of our statutes by cutting and felling the young stores when they usually fell their underwoods."

However arbitrary and paternal these regulations may have been, they show a keen desire to preserve timber at all costs. In the year 1614 we find a list of regulations drawn up which were to be inserted in all leases for the letting of future woods in New Forest, among which it was provided that "all timber trees are to be excepted, and all saplings of oak that are likely to make timber, and that 12 standels be left in every acre."

Not very much more of special interest relating to the New Forest appears in the records of this reign, except a detailed account of the different coppices and plantations, with much fault found with the condition of the fences, and a note that Holmsley Coppice "consisteth only of holly or holm, for the most part very old, and by reason that the country people have taken the bark off most of them to make bird-lime they are all decayed and dead"!

Similar surveys took place during the reign of Charles the First, but more with a view to raising as much money as possible from the various woods than with that of expending money on their renewal. Troubled times arose, and the king had matters to attend to more engrossing than the cultivation of his woods. Under the Commonwealth we do not find much care bestowed on the Forest, and it may be concluded that great waste went on. Nor did this waste terminate with the accession of Charles the Second, for one of the most curious of the State papers relating to this Forest is that in which Charles is "informed that two coppices—one called King's Copse . . . the other called New Copse . . . and that the underwoods of the said copses are valued at £1292 . . . besides the trees and saplings growing thereon, to be preserved for our own use. We are graciously pleased, upon the humble petition of Winifred Wells, one of the maids of honour to our dearest consort and queen, to give unto her the benefit of the said underwoods . . . etc., etc."

The king five years after, in 1669, did, however, decree that 300 acres of ground should be taken for a nursery and supply of wood and timber, in three separate lots of 100 acres each, the situations of which are named in the order. It is this same order that provides for the "impaling and fencing of the park called New Park" . . . "for the preservation of His Majesty's red deer coming out of France."

A commission of inquiry was again issued in the later days of

Charles the Second to inquire into "wastes, spoils, and abuses;" but the forests suffered much on the whole during the times of the Commonwealth and later Stuart kings. This is proved by actual surveys. In 1608 the survey of James the First, referred to above, showed that there were in the New Forest 123,927 trees fit for the use of the navy, containing 197,405 loads of timber. In 1707, after one hundred years of neglect and waste, the return gives a total of but 12,476 trees, containing 19,873 loads, fit for navy purposes.

This sad state of affairs had already roused attention, and the Act 9 and 10 William III. was passed, for, to quote the report of the commissioners of 1789 (one of the best histories of the New Forest ever compiled): "the greatest part of the trees had been felled, the fences of the ancient coppices destroyed, and the deer and cattle everywhere admitted, so that it was found impossible to restore the forest to its ancient condition without the aid of an Act of Parliament."

Under this Act it was provided that 2000 acres should forthwith be enclosed and planted with timber for the use of the navy only, underwood and all other produce being excluded; that 200 acres should be enclosed annually for twenty years following; and that as soon as any of the land thus enclosed was safe from damage by cattle it should be thrown open, and the like area enclosed in its stead. A provision was thus made for the planting of 12,000 acres at the least, and it was also held that a "rolling power existed by which, when these 12,000 acres were thrown out, a second 12,000 might be started upon." This power has been called in question, and it has been contended that the power extended in all to 12,000 acres only; the point was never finally decided, and in fact never arose, so that it is not worth discussing now. Each enclosure, when made, was to be properly "butted and bounded" by a surveyor, and the quantities thereof returned into His Majesty's Court of Exchequer. There was accordingly an exact record of each plantation that cannot be contravened, and perhaps it is on that account that some have sought to make out that this comparatively modern Act was the first effort made by the Crown to form woods in the Forest. It was, on the contrary, an abridgment and modification of the power exercised by the Crown without let or hindrance from time immemorial. In this Act the powers are defined and limited for the first time, and the "rights of common" are also referred to and defined to some

extent. In fact, we have in it the first indication of that struggle between the Crown and the commoners which has always been the great impediment to all forms of arboriculture in the New Forest since the days of the Commonwealth.

It will perhaps interest my readers to hear what was the precise form of cultivation employed. It is as follows: "Pits or beds of three spits of ground each were dug a yard apart, and three acorns planted triangularly in each bed. Half a bushel of acorns were allotted for each person to plant in one day; two regarders attended every day during the time of planting to see that it was properly done; and after the ground was fully planted with acorns it was sown with hawes, hollyberries, sloes, and hazelnuts, and drains cut where necessary, and traps were set to catch mice, and persons attended daily to re-set the traps and keep off crows and other vermin."

Whether from subsequent neglect or not, the plantations thus formed were never thinned at all, but allowed to grow up like a nursery quarter. Although contrary to every theory of plantation management, it cannot be denied that they were in this bad soil successful in growing a heavy crop of oak timber on moderate land. In fact, when some years ago the French professors of the School of Forestry at Nancy, with their pupils, visited this Forest, they expressed the opinion that nowhere had they seen a greater number of cubic feet of pure oak on the acre. We may thus learn a lesson from the mistakes, as they appear to be, of our ancestors, and note that where a heavy crop of timber, rather than handsome specimen trees, is the object, thinning may be easily carried to excess, especially on bad land.

By this Act of William III. the pollarding of trees received its death-blow; it was made a punishable offence for any keeper to top or lop any timber trees for the purpose of browsing the deer, and as the custom of farming the coppices had fallen into disuse, no one had any interest in thus dealing with the trees. We may therefore assume that all of the old pollards are of a date of more than two hundred years ago; and the lover of beautiful scenery cannot fail to contrast their picturesque forms with those of the more modern woods—even of those as old as William III.,—while there is food for reflection to the forester as to the additional age and beauty of form that has been conferred on those trees that have been thus maltreated in their youth.

However, this revival of forestry did not succeed so well as it

deserved. About 1022 acres were enclosed and planted and well cared for up to the age of some fifteen years; but for fifty years after that time nothing more was done. The interest of the keepers to whom the Forest was entrusted was, owing to the defective system employed, all against the growth of timber. A *divisum imperium* existed by which the keepers were under the authority of the Lord Warden, who had control of all things connected with the deer, etc., while the actual management of the timber was in the hands of another department altogether; naturally the two authorities were always at loggerheads. Moreover, the keepers and other officers were still paid by the bad old system of perquisites (of which the rabbits formed one)! Thus they obtained a vested interest in the Forest property, instead of being as now the paid servants of the public, and did not hesitate to petition against, when they did not openly resist, measures that they conceived to be injurious to their own interests.

All this was against tree planting; furthermore, to quote again the report of the commissioners of 1789: "the neighbouring inhabitants have been naturally led to partake in the spoil, and hardly to think it a crime to take what no one seemed anxious to protect." That this is no idle word is shown by an item in a return of certain receipts from the Forest, which appears in the most matter-of-course way, viz., "the like of casual oak trees found by the surveyor cut down, and by him seized and saved from being stolen. . . . Loads, 869. Value, £1526."

However, we find that after all, between the years 1761 and 1787, the Forest was capable of yielding timber valued at no less a sum than £87,952, of which £54,449 worth went for the use of the navy; and these figures illustrate the value in all respects to the nation of this magnificent property.

In 1750 a further enclosure of some 230 acres was made, and in 1776, 2044 acres more were enclosed, and this is, strictly speaking, all that was done under the Act of William III., which had for its aim the covering by degrees of the whole of the Forest with wood.

The plantations of 1776 are remarkable in one respect, as commencing an era which has gone far to alter the whole aspect of the New Forest, and even of the whole of the county of Hants adjoining. I allude to the introduction of the Scots fir, previously to that time unknown in the New Forest as a timber tree, but which has now fully established itself as the natural tree of this

part of England, where vast areas of land will really grow nothing else. The clump that was planted as an experiment, to ascertain if this tree would thrive in the worst soil and exposure in the Forest, is well known to every visitor as Ocknell clump. Ocknell enclosure—a very old encoppicement—was replanted in 1776, and it is probable that this clump, and those standing in Boldre-wood, were planted about this period. The tree itself appears in several of the plantations of that date, chiefly in the form of belts for protection of the plantation from the wind. In some cases these trees have attained good dimensions. Since that time it has been freely used as a nurse in all the younger plantations, and it reproduces itself with such great freedom, that tracts of the most barren open forest are gradually becoming wooded, sparsely at first, with this tree, in spite of cattle, fires, and every other obstacle. The use of Scots fir does not seem to have become universal till we come to the plantations made under the commissions of 1807 and 1809. These received an impetus by the Act 48 George III., which confirmed and enforced that of William III., and rectified certain irregularities in its execution.

Under this power more plantations were made, until by degrees the whole 6000 acres authorised by the original Act of William III. were enclosed; but so slow was the progress, that this was not accomplished until 1846.

The purpose for which they were made still continued to be that of producing oak for the use of the navy, and in many cases this tree had to be planted on land where its success was, to say the least of it, uncertain. The Scots fir was used as a nurse to some extent, and in many cases it has remained as the permanent crop, owing to the failure of the oak. In some cases Spanish chestnut replaced oak plants that failed early, and some fine specimens are the result, but this tree is very apt to grow shaky timber in the soil of the Forest.

During the seventy years in which these plantations slowly grew up, but little attention seems to have been paid to the New Forest, with the exception of some two or three Acts of Parliament passed to check and restrain the rights of common, which appear to have been exercised without much regard to law or order.

A very different order of things was about to spring up. The first indication of this was the appointment of a committee, with Lord Duncan as the chairman, to institute a general inquiry

into the management of the land revenues of the Crown. This committee sat in 1848 and 1849, but, owing to the intervention of a general election, never made its report to Parliament. It was followed by a commission in 1850, the report and sub-report of which form a most valuable account and history of the Forest and of its state at that time. Innumerable abuses seem to have crept in, both as to the management by the Crown officers, and as to the exercise of rights of all kinds by commoners and those who purported to be such. As the commissioners expressed it, "the condition of the New Forest may truly be termed mere anarchy!"

These inquiries culminated in an Act known as "The Deer Removal Act," by which the whole constitution of the Forest was changed. The tendency of the previous inquiries, and the disposition of Parliament, was to do away with such large areas of waste land, and to bring them into cultivation of some kind. About that date very many commons had been, and were being, enclosed all over the kingdom, and were brought into cultivation, in some cases to the great advantage of the class of small freeholder that was called into existence by the allotments of common; in other cases with less success. The whole spirit of the time was eminently utilitarian, and the legislation on the New Forest followed in the same line.

The first step was to abolish the deer, which from time immemorial had been the chief *raison d'être* of the Forest, but which, however picturesque and charming, were very costly to maintain, and no doubt had a deleterious effect on the morals of the population of the locality. In return for this right to maintain an unlimited quantity of deer, and thus to exhaust the feed to the last blade of grass, the Crown proposed to take the right to enclose 14,000 acres of land for the purpose of planting, and when this was free from damage by cattle, to throw it open and re-enclose 14,000 acres more. This arrangement was opposed by the commoners, whose rights had been year by year coming more into evidence, and the area to be enclosed was cut down to 10,000 acres, thus with the old 12,000 acres giving, without going into the question of the rolling power, an area of 32,000 acres to be enclosed for timber.

The divided jurisdiction was also done away with; the office of Lord Warden remained in abeyance, and the staff altogether was cut down to the most economical point.

At the same time an inquiry was held, at the request of the commoners themselves, into the extent and nature of their rights, which lasted some two years; and ultimately, at the expense of the Crown, a register was compiled and issued, which has ever since been decisive as to all claims, and the extent to which they may lawfully be exercised.

As this paper is written for those who live at a "far cry" from the New Forest, and are probably not conversant with the customs of that locality, it may be well to explain who and what are the "commoners," who have exercised of late years so restrictive a power upon tree cultivation. They are simply the landowners of the district—the proprietors of that 27,000 acres of private land that was mentioned as existing within the total area of the Forest, and of a considerable quantity more that lies outside its boundaries within a short distance therefrom. As in most other parts of the country, this land is mainly in the hands of the larger owners, and these do not, as a rule, cultivate the land themselves, but farm it out in the usual way, charging an additional rent for the land or house to which are attached the rights over the Forest, for in every case the right attaches to the actual land or house, and not to the individual owner or occupier. It is therefore clear to all who grasp the position, that the agitations which are conducted on behalf of the "poor commoner" are simply movements in support of rents in the first place, which are the fixed income of "forest rights," and, in the second place, of the less certain profit that is made by the exercise of them. No one, however, can blame anybody for firmly standing up for his rights, but a good deal of talk about the "preservation" of the noble old Forest is seriously discounted when the more sordid side of the question comes into view.

But as I said above, all these agitations are conducted on behalf of the "poor commoner" solely; the rich one who owns nearly all the rights being kept in the background, though very active on behalf of his poor neighbour. You may therefore be tempted to ask, "Has the poor commoner no real existence, or is he nothing but an imaginary stalking horse?" By no means; he has a very real, though a limited, existence, and a most praiseworthy hard-working prosperous specimen of the "small owner" he generally is. Too sensible as a rule to take part in the frothy agitations in which he is made to occupy so prominent a place, he is by no means averse to take advantage of anything that may be

gained for him, though quite content, if he be let alone, not to raise abstruse points of law or to grudge to others the full benefit and enjoyment that can be got out of the Forest.

From evidence given on behalf of the commoners before the Committee of the House of Commons in 1875, we find that the owners of holdings from 1 to 20 acres are about 580 in number, and own between them $\frac{1}{20}$ part only of the whole of the land entitled to rights of common. Of the remaining $\frac{2}{2}\frac{5}{0}$ths, $\frac{1}{2}\frac{4}{0}$ths, or rather more than one-half, is owned by ten large proprietors who possess not less than 2000 acres of land to which common rights attach, besides other property. Of the remainder, considerably over two-thirds is owned by about twenty-one possessors of over 500 acres of the land with rights, and the balance of about 7000 acres is owned by those who possess less than 500 acres of such land. The value of the common right has been recently stated to add one-half to the letting value of the land; a cottage with a turbary right fetches £1 a year more than one without it. These figures will show how large is the question of rent, as compared with any other which can be raised locally. There need be no difficulty in understanding why it is that the landowners of the New Forest[1] are so exceedingly alert to resist anything, whether for national or other purposes, that appears to touch, however remotely, the fringe of their rights over the Forest, and to invoke the aid of the public by the cry that the whole Forest is in danger, when some comparatively unimportant local question is under discussion.

The rights of common are of three kinds: common of pasture, of turbary, and of estovers, or fuel wood. The first of these rights is in itself perfectly harmless; there is ample room for all those who desire to exercise it, to turn out their cattle to make the best of what can be got out of the Forest, where the feed is at best of the most inferior kind, only fit to nourish inferior stock. It is the abuse of the right that makes it hurtful from the national point of view, such as when the planting of a few trees in the open spaces of decaying woods is resisted, on the plea that they occupy space where enough grass might grow to increase the feed by a few mouthfuls. Indeed, of late years we have had such absurdities as proceedings taken against a golf club "for injury to the commoners' pasture," by the cutting of 9 holes 4½ inches

[1] The total number of Commoners who claim "common right" in the New Forest has been recently stated in evidence to be under 900.

in diameter! against a telegraph company for the loss of pasture by the space occupied by their poles! even against a converter of felled timber for the injury caused by depositing a heap of saw-dust! and all of these operations have had the sanction of the Crown as owner of the Forest. It is but fair to the actual exerciser of the right of pasture, to say that he is, as a rule, no party to these proceedings, caring like Gallio for none of these things so long as his right is not really interfered with, which he knows will never be done by such practices as have been described. It is his active friends who thus engage in warfare on his behalf, especially when an election is pending!

The other two rights, of turbary and estovers, are both entirely harmful. The "turbary" or turf right is practised by paring the surface of the heath lands, removing the heather with its roots and all vegetable humus, which make a kind of inferior fuel—there is no real peat in the Forest. The land, poor at first, is impoverised by the removal of what little soil will grow even heather; then, as in course of years it slowly recovers, and the roots of the adjoining plants spread over the denuded space, it is again pared, and so on year by year. Nothing can be imagined more injurious to land, and the only excuse for the practice is, that it is only performed on land of the very worst quality, and is a boon to the poorest of the population. It is greatly falling into disuse, to the public advantage.

The common of "estovers" is also a most injurious tax on the property of the public. Every report or inquiry that has been held on the Forest, has recommended that this claim should be abolished. As long ago as the twenty-sixth year of Queen Elizabeth it was ordered, with the view of checking the growth of this practice, that "no inhabiters of any house newly builded since the beginning of the Queen's Majesty's reign that now is, shall be allowed any wood in the same forest to be burnt and expended therein." The claims consist of so many loads of "good fuel wood," and each house now enjoying the right is supposed to be able to trace its existence back to the commencement of the reign of Elizabeth. But it is to be feared that this order has been frequently evaded, for it appears that in 1809 the number of loads had risen to 841, of which 160 were stopped as being unlawfully claimed. In former years this right was the subject of very great abuses. Whole trees of beech, or even oak, were assigned, and often more trees were cut than were assigned, while much damage to young timber was

done in felling them. The wood is all now cut and stacked before it is delivered, and while abuses are thus prevented, a considerable charge is made on the public purse for the labour. The right is more destructive than formerly, for as it is limited to the "waste of the forest," and as all planting is now at an end, while the existing young plantations are subject to enclosure, and thus free from the right, it follows that it can only be satisfied from the ancient plantations of the Stuarts, or of Elizabeth, which are the very woods standing most in need of protection. In view of this destruction, the Crown authorities have lost no opportunity of buying up the rights of all who would sell them at a fair price. The number of loads, or "cords" of wood is thus reduced from 800 to 367 in the present year, which are held by forty-three owners, about one-third belonging to one landlord. In 1883 the Commissioner of Woods, Sir Henry Loch, introduced a bill to buy up all these fuel rights, at a price to be decided either by arbitration, or by the magistrates of the county in petty sessions. The bill was vigorously opposed by the commoners, and though it readily passed through the committee stage, yet owing to press of business it did not become law, and the Crown authorities have not renewed the good offer that was thus rejected. The right thus remains as a perpetual drain on the most precious part of the Forest.

The origin of these common rights is obscure. By some it is contended that they were existent before the actual formation of the Forest. It is very probable that the inhabitants of the district did make what use they thought right of the whole of the waste land at their doors; but this is hardly consistent with the idea of a "right," by which is implied a claim on the part of one man to make certain use of the property of another. Manwood says that the rights were granted by the Crown as a sort of compensation for the hardships inflicted by the enforcement of the forest laws. This seems probable, and is an explanation of the existence of the earlier rights. So little is heard of these rights up to about the year 1700, while there is so much written about the Forest, that it would seem that they were few in number, and, with the exception of the fuel right, not of sufficient importance to attract attention. During the 18th century they come prominently into notice, and as during the same period there is much said of the lack of order in the Forest, and the need for enforcing the law more strictly, it seems that the commoners availed themselves of

this state of things, to possess themselves of the various rights without any further claim than that of usurpation, upon which it is to be feared the original title of nine-tenths of these claims rests. Precisely the same state of things existed during the earlier part of this century, and the commoners seem to have multiplied exceedingly, so that we may take it that while some of the rights are very ancient, and held by grants from the Crown—as, for instance, the Charter of the Abbey of Beaulieu, given by King John—yet that most of them came into being during the one hundred and fifty years from 1700 to 1850, and were acquired by simple usurpation, which in time became a prescriptive right. This explanation will show what is the nature of the right claimed by the commoners, the extent to which it has grown, and the great impediment which it presents to anything like arboriculture, even in such form that the Forest might be handed down to posterity as a possession similar to that which we have inherited.

To return to the legislation of 1850, which, as I have said, was eminently utilitarian. One of the first steps was to institute a survey to ascertain what amount of timber fit for the navy was standing in New Forest. It appears that none had been supplied since 1833, and consequently a large amount was found ready for use. During the next few years a very large quantity was felled, both to supply present wants and to clear the ground for the planting of the area prescribed by the Deer Removal Act. A second proceeding was to complete the planting of the William III. legislation, and to do this some 6000 acres had to be cleared and planted. As the commissioners were bound to select, in the first place, land suitable for the growth of navy timber, their choice was restricted to the better land, all or nearly all of which had, at some time or another, been enclosed and planted. It was at this time that the majority of the William III. woods were felled and replanted. Much blame has been showered on those in charge of the Forest for acting thus, but it is difficult to see what other course they could pursue. The plantations had been formed solely in order that when mature they might supply the navy; they had arrived at the mature stage, and contained a large amount of valuable timber of which the navy stood in need. It was impossible to resist the claim of the dockyards, although to grant it involved the sacrifice of many acres of beautiful woods, which were a source of pleasure to the inhabitants of the locality, who loudly protested against their removal. There was the more

excuse, because authority had been given to replant, and every wood as it was cleared was replaced by a young plantation, which is in most cases now producing a crop of oak that, at an equal age, will vie with or surpass the older wood which it has replaced. The pendulum had, however, swung too far. Before the whole of the power obtained under the William III. Acts was fully exhausted, or very soon after that given by the Deer Removal Act had commenced to be put in force, it was apparent that the effect of the measure was to gradually cover the whole of the Forest with wood. The idea of this filled the commoners with apprehension, for they feared that, in spite of the removal of the deer, the amount of pasture, as the land became planted up, would be much decreased. Moreover, the new Act authorised the planting of trees other than those for navy use, so that the inferior land became available for the growth of Scots fir, while a provision inserted at the instance of the commoners to guard against good land only being taken, compelled the formation of enclosures not less in extent than 300 acres in each case, so that the inconvenience to the inhabitants was increased. Another important factor in the situation arose in the increasing appreciation shown by the public of the beauties of the New Forest, and its value as a recreation ground. Perhaps most important of all was the change that occurred in the building of ships, whereby iron was substituted for wood, and British oak, from being of paramount national importance, became a drug in the market. When, therefore, but 5000 acres out of the 20,000 acres authorised by the Deer Removal Act had been planted, and as soon as the deer had been removed and the register of the commoners completed, an agitation of the most active kind was instituted by the commoners against the further carrying out of the bargain of 1851. The public was led to believe that the enclosures, which were made against the cattle of the commoners for the protection of the young trees, were really intended to exclude it from the Forest altogether, and though nothing could be further from the truth, the idea caught hold, and the press were loud in their support of the commoners, and in their deprecation of the policy which Parliament had so lately ordained. There was much to be said in favour of an alteration of that policy. With the cessation of the needs of the dockyards for oak timber, the pressing necessity for a continuous supply came to an end. As population increased, the wants of more open spaces became more and more felt, and it was a reasonable thing for the

nation to decide that as an open space the New Forest was of more value than as a timber farm worth so many thousands a year. The effect of the first great exhibition had begun to tell; the æsthetic education of the people had commenced, and one of its first effects was shown in the growing appreciation of beautiful scenery. All these causes, after being at work for some years, culminated in the practical repeal of the Deer Removal Act, and in the passing of the Act of 1877, under which the Forest is now administered. But just as in the former case, the pendulum again swung too far. A bitterness had been imported into the discussion, which was as mischievous as it was deplorable, and, just as in 1851 the provisions of that Act, by the excessive planting they ordained, resulted in the long run in abolishing all planting whatever, so now, in 1877, an Act was passed which, while intending to provide for the preservation of the woods of the Forest, in reality prevented any steps whatever being taken for that end. A hard and fast line was drawn between plantations formed since the year 1700, and those made previously. The former alone were allowed to be re-enclosed or replanted, but as they were all well covered with a crop of trees, the provision was of little or no use. Under no circumstances may the whole of the crop be removed from a single acre, so that in the event of a last thinning being reached, or a failure of the crop setting in, the decaying trees must be left to perish at their leisure, and the wood will have to wait till, by the hand of time or some serious gale, it is cleared enough to admit of a chance of regeneration by enclosing and natural succession. As the time when this can for the most part be done is in the dim future, it is not worth while to speculate upon what may then take place. But the case of the older woods is widely different. These are naturally, from their greater age, the very ones that stand most in need of being specially protected, and call for some steps to be taken to provide that they shall be perpetuated in all their magnificent beauty. Unhappily, the Act that in so many words ordains that they shall be preserved, in the same breath prevents that object being achieved.

Under no circumstances may one single rod of land outside the limits of the "ear-marked" plantations be enclosed against the cattle of the commoners. It would be waste of time for me to enter into the impossibility of arboriculture on land that is open to excessive grazing. Most of these woods are far past their best,

and are hastening to their end; every gale leaves gap after gap in their ranks; in all of the less recent of these gaps may be seen hundreds of the young saplings and scions of the ancient trees struggling up only to be gnawed down and destroyed or injured by the cattle, except where kindly thickets of blackthorn here and there save them from the injury, and show, as if in mockery, what a wealth of reproduction is in the soil if the simplest protection be afforded, and Nature left to do her own work with a free hand. This is prohibited by a well-meant but ill-drawn Act. As things stand now, the old woods of the Forest, the glory of the greatest of our national estates, are being slowly destroyed by Act of Parliament! Nothing is more certain to the observant forester than that these woods, under the present system, are gradually diminishing, and that a second generation of trees will see them, from having become a mere remnant of their former selves, disappear altogether; and so the best land in the Forest will become denuded entirely of trees, and the property will be to posterity but a shadow of what we now enjoy, owing to the care and better management of our ancestors.

Arboriculture may for the present be said to be dead in the chief national forest. It is practically restricted to the thinning of a certain number of plantations of no great age. From these, revenue has to be obtained to keep up the roads, drains, bridges, etc., over a vast tract of unremunerative land, and as long as they can perform the task, the country enjoys its vast park free of cost. Planting is restricted to replenishing the damage wrought by occasional fires or similar disasters. A certain amount of planting of single trees in the open spaces of the older woods has been done, in the teeth of strenuous opposition from the commoners or their allies; but the great size of the trees that had to be used, so that they might be safe from cattle, and the consequent expense and numerous failures, have proved this to be but a broken reed to rely upon to stem the rapid decay of old woods past a certain stage of growth. For the latter part of this century the managers of the Forest are forced to assume that position of lookers-on at decay and deterioration which they were so heavily blamed for voluntarily taking up during the first years thereof. In fact, by a curious turn of the wheel, the Forest has gone back about four hundred years, and is again under rules such as governed it from the days of the Red William to those in which a revival first took place, and planting or care of some kind was bestowed upon the

woods. The position is, however, curiously inverted. As by the old forest laws no subject might cut woods, even on his own land, within the "regard of the forest" for fear of interfering with the prerogative of the Crown, so now the Crown may not clear timber on its own land for fear of interference with the pleasure of the subject! Even the cutting of a few decayed trees will generally provoke attacks in the newspapers, and assertions that the law is being contravened! And as in ancient days no man might erect a house or building on his land, so now an enclosure of any kind, even the smallest, made by the Crown upon its own land, is held to be contrary to the latest law upon the subject, and the representatives of the commoners watch jealously for an occasion to put the letter of the law in force against it. Thus to set four hurdles around a group of young trees that are being destroyed by the cattle, or to protect a spring of water from pollution by a fence, would be held to be a heinous offence against modern forest law, just as in former days a man might "lose life or member" for the like offence. A village or a house may be reduced to the extremest danger for lack of a supply of water or for the means to drain its premises, where the necessary land can only, by reason of the circumstances, be found in the adjoining forest; but it may perish from epidemic disease before it can, save by the costly intervention of Parliament, obtain so much as one rod of waste land from whence to draw a supply of unpolluted water, or on to which to convey out of harm's way its accumulating sewage. Nay, even in cases where the aid of Parliament has been sought, opposition has sprung up to prevent dwellers in this Forest from obtaining those advantages which they would readily obtain if they lived outside the verge. In this way we have a reproduction of the ancient hardships of the old forest law, such as were found intolerable in the days of Magna Charta, and may be said to have reverted to the condition of affairs that prevailed six centuries ago, both in sylvicultural as well as in other matters. What the next turn of the wheel may bring it is impossible to foretell; but it is to be hoped that the reaction from the present state of affairs may not, as on former occasions, be too great a one, and will be only such as may remedy the existing evils, and may tend to preserve the beauties as well as the usefulness, in all respects, of this magnificent national inheritance.

To the student of arboriculture the New Forest will always be

a most interesting field for observation. In it, as I have explained, may be traced the earliest efforts of our ancestors in the direction of tree cultivation, sometimes successfully, sometimes thwarted by adverse circumstances. The results of the various methods may be watched, from the first days of encoppicing and farming out, with its attendant shrouding and pollarding. The later method of sowing mast broadcast, and leaving it to take its chance can be seen; but in this and the foregoing case we have only the successes to judge by—the failures have long been wiped out. Later on we come to the more modern methods of planting according to the style introduced by Evelyn, and of the introduction of nurses of the coniferous kind. The effects of the too rapid removal of the nurse, and of its being left till too late, can all be seen by those who will observe and will take pains to learn the history of the district. Still later we come to those plantations that afford an object-lesson in the reclamation of waste land, and which show what can be done with land that is good for no other kind of cultivation, and in some cases will not even do to plant. We have also admirable specimens of natural reproduction by the simple method of enclosure, and leaving the parent trees to seed the ground.

Although for the present all progressive arboriculture is at a standstill, nevertheless, much may be learnt from what was done more or less continuously up to twenty years ago. Many kinds of tree have been tried in the Forest by way of experiment. Some forty years ago large consignments of the seed of the deodar were received from India, and the experiment of growing them was well tried in the New Forest. Except in a few favoured spots where they have done very well, they have proved a failure, and the result of the experiment may be traced by any one desirous of testing it. The Douglas fir has also been largely tried, under rather rougher conditions than prevail in the well-kept pinetum of most ardent arboriculturists, and is a most pronounced success. Many others of the best of the coniferæ have been planted in groups or in avenues, and form objects of great beauty, affording illustrations of varying success that are instructive. Possibly at some future time this Forest may be again available for experiments that are of interest to the whole world of tree planters, but until that time arrives a good deal may be learnt from what has been done before all enterprise of the kind was abolished. It is to be hoped that such visits as that of the Royal Scottish Arboricultural

Society may help to dispel the idea which has been so sedulously fostered in the public mind, that everything in the shape of planting is of necessity an injury to the public enjoyment, instead of, as is really the fact, tending to beautify their property and add to their pleasure. That young plantations will ever be as attractive as ancient woods is not to be expected, but there is a tender age that all woods must pass through at first, and had our ancestors pursued the selfish policy which prevails at the present day, and merely enjoyed their old woods without making any provision for their renewal, how different would be the Forest of to-day from the beautiful possession that the public so much enjoy, and which every endeavour should be made to improve and perpetuate to future ages.

III. *Sections of Woods grown in Britain.* By D. F. Mackenzie, Factor, Mortonhall, Midlothian.

In submitting this assortment of 160 sections of the woods of trees and shrubs grown in Britain, the writer is fully sensible of the incompleteness of the collection, and also of minor shortcomings. As may be readily understood, the work is attended with some difficulties, even to the expert.

Several beautiful collections of European woods have been made by Nordlinger and others,—Professor Hartrig is at present making a collection,—but, so far as the writer is aware, there is no collection of this kind, representing trees and shrubs of British growth, available for educational purposes, except, perhaps, in botanic gardens. Neither have these authors put their sections into media similar to the present collection, the advantages of which are very evident. They make the sections available for the microscope as well as for lantern work. By the miscroscope, analysis of the structures is rendered complete; and by the lantern, the anatomy of the timber is made perfectly clear.

The process, in a general sense, is simple, and comparatively inexpensive. If it does entail a good deal of patience and some expense, it is highly educative, and that fact alone should be sufficient recompense to the student, the collector, or the forester. Although it is attended with some difficulty, it can be performed by any person of ordinary intelligence who has the specimens, the tools, and the time to devote to it. By this process, all the various genera and species of wood or timber can be distinguished from each other—a point of very great importance to the student, and of much interest to the forester, even if he does know all about the trees and shrubs in their growing state.

The method of preparing the sections is shortly as follows:—Procure samples of the woods, and see that they are all true to name. They should be freshly cut, and from plants of average growth, so as not to give an exaggerated impression when shown by the lantern. Any size will do from a quarter of an inch to three inches in diameter; and the sections may be cut either transverse, longitudinal, radial, or longitudinal circumferential, or in all of these forms, as the case may be. It is best to have one section of each form, because they will show the structural formation of the wood in all its phases.

To cut a section,—fix the selected piece of wood firmly into a

wooden mould, and with a very sharp, square, iron-soled plane, shave off a number of thin slices; placing the slices in pure alcohol, in order to free the tissue from air and water. After a few hours' soaking, they may be removed and put between blotting-paper to dry, applying pressure to keep the sections flat and free from ripples. The slices or sections should not exceed $\frac{1}{100}$ of an inch in thickness. When they are thoroughly dry, the slices may be stained. Any colour will do, but violet is best adapted for the purpose. The stain is prepared from the ordinary aniline dyes, a small quantity of which is dissolved in pure alcohol. The sections should be placed for about a minute in the dye, then removed and again placed between blotting-paper to remove any superfluous dye. When they are dry, place them in pure benzole. This will remove the last trace of water and air from the cells.

The section is now ready for mounting between the glasses of the slides. This is best done with a mixture of Canada balsam, eight parts, and pure benzole one and a half parts. Mix thoroughly, and be certain that there are no air-bubbles in it. Place a little of the mixture on the main glass, and then take the section, now soaked and wet with benzole, and place it on the balsam; press down the cover-glass tight upon it, so as to squeeze out all air-bubbles, and then set it aside to dry.

The main glasses should be of a uniform size, not larger than $3\frac{1}{2}$ by 2 inches. The cover-glass should be at least half an inch shorter, and a quarter of an inch narrower than the main glass.

After the balsam is set and perfectly dry, which will be in about two months, the slides should be bound with slips of gummed paper. This will prevent the glasses from slipping past one another.

This form of slide is only of use for the microscope, and for lanterns with micro-fronts.

If a transverse section of the stem of any hardwood tree, and of any poplar, willow, or conifer, be examined with a microscope of even a low power, the great differences in their structure will be seen at a glance. The oak stands out distinctly in its structure from all the other broad-leaved trees, and the latter from the conifers, which in themselves form a distinct group, differing, however, more or less, in every genera and species. Generally speaking, every species of wood differs in the number, size, or position of the vasa, and the compactness of the vascular tissue; the number and size of the medullary rays; and in the pines, the more or less frequency

of the resinous canals in their structure. The general differences clearly indicate the genera; and while the distinctive features are not quite so constant in the species—the structure of which is modified by the soil, situation, and exposure,—still they are usually so clear and distinct as to demonstrate the species, and in many cases the variety.

In the timber of the pine tribe there are no *true* vasa, but it exhibits numerous pores, which botanists call resinous canals, irregularly distributed in groups, or otherwise, in the concentric layers or zones, and varying in number according to the species. The pores in the duramen or heart-wood are usually in a congested state with resin, which prevents the free passage of liquids through the wood. Those situated in the alburnum or sapwood are generally quite clear and open. In the structure of the arborvitæ, cedar, cypress, yew, and silver fir, there are no resinous canals.

As already stated, the tissues of the various kinds of wood are easily distinguished by the number, size, and position of the vasa and canals, together with the density of the zones, and the size and number of the medullary rays. The medullary rays in the pine tribe are extremely numerous, usually placed in groups (as seen in a vertical or radial section), cylindrical in shape, and very much compressed. With the aid of the process known as "photo-microphy" this is made quite clear, and illustrations are given herewith of some of the leading species, which will explain the nature and usefulness of the sections. These illustrations are produced from photographs which were taken from the woody tissue, and are not of a hypothetical character, consequently they are the more valuable for reference.

The tissue of the timber of conifers is among the simplest and most interesting. By reference to the illustrations (Figs. 1 to 7), it will be seen that in its construction it resembles a network of rather regular meshes. The wood of the *Wellingtonia gigantea* (Fig. 7) is a good example of this, in which the resinous canals are situated at the union of the spring and the previous autumn growths, and irregularly arranged in more or less continuous circles; yet at the same point in the growth, the canals are sometimes quite absent from several consecutive annual rings. The resinous canals of *Abies Menziesii* are somewhat similar to those of the *Wellingtonia*, but much more constant, and are distributed irregularly throughout the whole zone.

Another characteristic of the structure of coniferous timber is

the open nature of the spring wood as compared with that of the autumn growth. The latter gradually closes up, and the timber produced in autumn is therefore much more dense, making the annual growths appear in concentric zones. A good example of this is seen in the illustration of a transverse section of the Silver Fir (Fig. 2), in which the dense autumn growth is very conspicuous. The medullary rays are very numerous in all the species of coniferous plants, as will be observed on carefully examining the illustrations of Conifers (Figs. 1 to 7), and they are specially noticeable in the Larch (Fig. 4).

In the broad-leaved trees (Figs. 8 to 24) the tissue is altogether different, and more compact, than that of the conifers. The concentric rings contain a large number of vasa, or pores, varying in size, number, and position, according to the species, but in most of them they gradually diminish in size and number from the spring to the end of the autumn growth. This is particularly the case in the Oaks (Figs. 16 to 18) and Elms (Figs. 23 and 24); while in the Maples (Figs. 8 and 9), Poplars (Fig. 14), and Willows (Fig. 19) they are nearly uniform throughout the growth.

The medullary rays are a distinguishing feature of many of the genera of broad-leaved trees. This is well shown in the structure of the Oak (Figs. 16 to 18), in which the rays are generally very large, but not so numerous as in the Maples (Figs. 8 and 9). The size and number of the rays differ also in most of the species. It would appear that the medullary system regulates to a considerable extent the size, number, and distribution of the vasa. If this supposition is correct, it may throw some light on the commercial value of the timber of different varieties of the oak and other trees. This matter will be more easily understood by a reference to the illustrations of the transverse sections, especially if the observer has a practical knowledge of timber. If the structure of the timber of *Quercus Robur* (Fig. 18) be contrasted with that of *Quercus Cerris* (Fig. 16), and the latter with the wood of Poplar (Fig. 14) or Willow (Fig. 19), it may form a key to the cause of the longevity of certain trees over that of others grown under similar circumstances. To the writer it is very evident that the durability of timber is regulated, in a general sense, by the size and number of the vasa and the medullary rays. In the oaks, both size and number of the vasa decrease with age, while the medullary ray-plates increase very much in size. This is not the case in the woody structure of the pines, willows, or poplars.

In the Maples (Figs. 8 and 9) the medullary rays run straight out from the pith, and are very numerous. The vasa are uniformly distributed in groups of from two to five, and are nearly of the same size, giving the wood of the whole tribe that even consistency which makes their timber of so great value for certain purposes.

The vasa in the wood of the Poplars (Fig. 14) and the Willows (Fig. 19) are extremely numerous, nearly of equal size in the spring and autumn growths, and regularly distributed throughout the wood. The medullary rays are also numerous, straight, and very small in all the species.

In the Beech (Fig. 11) the medullary rays are large and numerous, the vasa being pretty uniformly distributed throughout the tissue.

It is the oak tribe, however, which shows itself the most distinct. In it the vasa are very numerous, and of various sizes in the same group, gradually diminising in size as the season's growth advances. These vasa or cells are surrounded by organised tissue. The latter is connected to the spiral filament contained in the cell, which in turn is connected with the medullary system. This, however, is true of several other genera of timber trees. The medullary rays in the whole of the oak tribe are very large, but comparatively few in number.

Botanists have classified, in a general way, the vasa or pores, and the medullary rays, into six sizes. The vasa are arranged thus—those of the category of the Oak, *large;* Common Elm, *medium large;* Whin, *medium;* Maple, *fine;* Spindle Tree, *very fine;* and Holly, *extremely fine.* The medullary rays are classified in the same manner, viz.—those of the size of the Oak, *very large;* Alder, *large;* Sycamore, *medium large;* Common Maple, *medium;* Ash, *narrow;* and Birch, *very narrow.*

If these woods are examined through an ordinary pocket-lens, this typical arrangement will be found to be pretty nearly correct. It will be found absolutely correct, if due allowance is made for age, and for the position in which the timber has been grown. For example, if the vasa and medullary rays of a stunted Oak are compared with those of a vigorous Spanish Chestnut, the vasa of the latter will be found slightly larger, but there is quite an outstanding distinction in the surrounding tissue, as well as in the medullary rays, pointing clearly to the fact that the wood is not oak.

From the illustrations, it will be observed that some hardwoods resemble each other in their general features. For example, the

construction of the wood of the Beech, Oak, Walnut, and others, has a general resemblance; but if they are examined together it is seen, at a glance, to be entirely different. This difference is most marked in the tissues surrounding the vasa and bordering the medullary rays.

An examination of a transverse section of timber by transmitted light shows that the concentric rings in an exogenous plant are not always representative of a year's growth, nor is this notable feature confined to any particular family. The irregularity may be caused by chilling storms during the growing season, or by over-thinning the trees at the same period. The latter operation has a detrimental effect upon the production of timber, and an example of this is seen in the illustration of the Silver Fir (Fig. 2). It is there shown, that for several years after thinning took place, the tree made very little progress.

Illustrations are also given of the wood of the Cedar (Fig. 3), Horse Chestnut (Fig. 10), Honeysuckle (Fig. 13), Pear Tree (Fig. 15), *Theophrasta imperialis* (Fig. 20), a tropical tree grown in a plant stove; Lime Tree (Fig. 21), and Whin (Fig 22), by way of comparison with those already mentioned, and to show the great difference that prevails in the structure of the wood between closely allied genera and species, as well as in those further apart in the natural system.

The following is an alphabetical list of the Sections of Woods, in the same order in which they are numbered in the Cabinet of Micro-Lantern Slides which accompanies this report :—

1. Abies alba.
2. Abies Albertiana.
3. Abies canadensis.
4. Abies Douglasii.
5. Abies excelsa.
6. Abies Menziesii.
7. Abies morinda.
8. Abies Nordmanniana.
9. Abies pectinata.
10. Abies Pinsapo.
11. Acacia Riceana.
12. Acer campestre.
13. Acer platanoides.
14. Acer Pseudo-Platanus.
15. Æsculus Hippocastanum.
16. Ailantus glandulosa.
17. Alder root.
18. Alnus glutinosa.
19. Amygdalus persica.
20. Andromeda floribunda.
21. Araucaria imbricata.
22. Ash root.
23. Azalea pontica.
24. Beech root.
25. Berberis dulcis.
26. Betula alba.
27. Biota orientalis.
28. Birch root.
29. Buxus arborescens.
30. Camellia japonica.
31. Carpinus Betulus.
32. Carya alba.
33. Castanea vesca.
34. Cedrus atlantica.
35. Cedrus Deodara.
36. Cedrus Libani.

37. Cerasus avium.
38. Cerasus domestica.
39. Cerasus Laurocerasus.
40. Cerasus Laurocerasus caucasia.
41. Cerasus Laurocerasus colchica.
42. Cerasus lusitanica.
43. Cerasus Padus.
44. Citrus vulgaris.
45. Clematis vitalba.
46. Cornus Mas.
47. Cornus sanguinea.
48. Corylus Avellana.
49. Cotoneaster affinis.
50. Cratægus macrantha.
51. Cratægus oxyacantha.
52. Cryptomeria elegans.
53. Cryptomeria japonica.
54. Cupressus Lawsoniana.
55. Cupressus macrocarpa.
56. Cytissus Laburnum.
57. Dimorphanthus mandshuricum.
58. Elm root.
59. Eucalyptus globulus.
60. Euonymus europæus.
61. Fagus sylvatica.
62. Ficus carica.
63. Ficus elastica.
64. Fraxinus excelsior.
65. Fraxinus excelsior pendula.
66. Fraxinus parvifolia.
67. Fraxinus pubescens.
68. Genista anglica.
69. Hedera Helix.
70. Ilex aquifolium.
71. Jasminum officinale.
72. Juglans nigra.
73. Juglans regia.
74. Juniperus communis.
75. Juniperus sinensis.
76. Larix europæa.
77. Laurus nobilis.
78. Libocedrus decurrens.
79. Ligustrum vulgare.
80. Liriodendron tulipiferum.
81. Lonicera Periclymenum.
82. Magnolia acuminata.
83. Magnolia americana.
84. Magnolia conspicua.
85. Oak root.
86. Pavia californica.
87. Philadelphus coronarius.
88. Pinus Austriaca.
89. Pinus Cembra.
90. Pinus excelsa.
91. Pinus Laricio.
92. Pinus mitis.
93. Pinus montana.
94. Pinus Pallasiana.
95. Pinus ponderosa.
96. Pinus pyrenaica.
97. Pinus resinosa.
98. Pinus rigida.
99. Pinus Strobus.
100. Pinus sylvestris.
101. Pinus sylvestris (rad. sect.).
102. Populus alba.
103. Populus balsamifera.
104. Populus balsamifera (rad. sect.).
105. Populus monilifera.
106. Prunus domestica.
107. Prunus spinosa.
108. Pyrus Aria.
109. Pyrus aucuparia.
110. Pyrus communis.
111. Pyrus Malus.
112. Pyrus pinnatifida.
113. Pyrus Sorbus.
114. Quercus alba.
115. Quercus Cerris.
116. Quercus Cerris argentea.
117. Quercus Cerris suberosa?
118. Quercus Esculus.
119. Quercus Ilex.
120. Quercus Lucombeana.
121. Quercus montana.
122. Quercus palustris.
123. Quercus pedunculata fastigiata.
124. Quercus pedunculata heterophylla.
125. Quercus Robur.
126. Quercus rubra.
127. Quercus sessiliflora.
128. Retinospora pisifera.
129. Retinospora plumosa.
130. Rhododendron ponticum.
131. Rhus typhina.
132. Ribes Grossularia.
133. Ribes nigrum.

134. Ribes sanguinea.
135. Robinia Pseud-Acacia.
136. Rosa rubiginosa.
137. Rowantree root.
138. Salisburia adiantifolia.
139. Salix caprea.
140. Salix viminalis.
141. Sambucus nigra.
142. Sophora japonica.
143. Staphylea pinnata.
144. Symphoricarpus racemosus.
145. Syringa vulgaris.
146. Taxodium distichum.
147. Taxus baccata.
148. Taxus baccata fastigiata.
149. Theophrasta imperialis.
150. Thuja gigantea.
151. Thuja occidentalis.
152. Thujopsis borealis.
153. Tilia americana.
154. Tilia europæa.
155. Tilia grandifolia.
156. Ulex europæa.
157. Ulmus campestre.
158. Ulmus effusa.
159. Ulmus montana
160. Viburnum Opulus.
161. Viburnum Tinis.
162. Vitis vinifera.
163. Wellingtonia gigantea.

The Album, presented to the R.S.A.S. along with this paper, contains a set of 62 highly magnified Photographs of Sections of Woods. They are photographs of *transverse sections* of the wood, except where mentioned in the following list,—which is arranged and numbered the same as the Album.

FRONTISPIECE.—*Eucalyptus globulus* (Blue Gum), showing general structure of wood, cells, and medullary rays; × 40 diam.

1. *Wellingtonia gigantea*, showing general structure, resinous canals, and secretions in the tissue; × 40 diameters.
2. The same, with rays, resinous canals, and cells full of pigment; × 80 diameters.
3. The same, showing details of resinous canal; × 200 diam.
4. The same; a longitudinal circumferential section showing cells, medullary plates, and tissue; × 200 diameters.
5. *Cedrus Libani*, showing tissue and rays; × 80 diameters.
6. *Araucaria imbricata* (Chilian Pine), showing tissue and rays; × 80 diameters.
7. *Pinus Strobus* (Weymouth Pine), showing structure, resinous canal, and union of spring and autumn growths; × 80 diam.
8. *Pinus Laricio* (Corsican Pine), showing resinous canal and rays; × 80 diameters.
9. *Pinus sylvestris* (Scots Pine), showing structure, rays, and coagulated resin in canal; × 80 diameters.
10. The same, showing resinous cells; × 60 diameters.
11. *Larix europæa* (Larch), showin structure, rays, and resinous canals; × 60 diameters.
12. *Picea pectinata* (Silver Fir), showing structure, union of spring and autumn growths, and bad effect produced by overthinning; × 60 diameters.
13. *Pinus Cembra*, showing structure, rays, resinous canals, union of spring and autumn growths, and malformation of tissue through injury to cells; × 60 diameters.
14. *Abies Albertiana*, showing the general structure and rays; × 60 diameters.

15. *Abies excelsa* (Norway Spruce), showing structure, canal, rays, and union of spring and autumn growths; × 60 diameters.
16. *Thuja occidentalis* (American Arborvitæ), showing structure, rays, and the effect of transplanting; × 60 diam.
17. *Cupressus Lawsoniana* (Lawson's Cypress), showing structure, and union of spring and autumn growths; × 60 diameters.
18. *Salisburia adiantifolia* (Maidenhair Tree), showing the peculiar tissue of the tree, union of spring and autumn growths, and coagulated sap in cells; × 60 diameters.
19. *Quercus Robur* (Oak), showing vasa; × 200 diameters.
20. *Quercus Ilex* (Evergreen Oak), showing vasa and structure; × 80 diameters.
21. The same; × 100 diameters.
22. The same, longitudinal circumferential section, showing vascular tissue and medullary plates; × 100 diameters.
23. The same, longitudinal radial section, showing vascular tissue and medullary plates; × 100 diameters.
24. *Pyrus communis* (Pear), showing vasa and medullary rays; × 80 diameters.
25. The same; × 35 diameters.
26. *Pyrus aria* (White Beam Tree), showing vasa, tissue, and rays; × 80 diameters.
27. *Acer Pseudo-Platanus* (Sycamore), showing vasa, tissue, rays, and union of two seasons' growth; × 80 diameters.
28. *Acer campestre* (English Maple), showing vasa, tissue, rays, and union of two seasons' growth; × 200 diameters.
29. *Alnus glutinosa* (Alder), showing vasa, rays, and union of two seasons' growth; × 80 diam.
30. *Æsculus Hippocastanum* (Horse Chestnut), showing vasa, rays, and union of two seasons' growth; × 80 diameters.
31. *Tilia europæa* (Lime), showing vasa, rays, and union of two seasons' growth; × 80 diam.
32. *Juglans nigra* (Walnut), showing vasa, tissue, and rays; × 80 diameters.
33. *Ilex aquifolium* (Holly), showing vasa, tissue, rays, and union of two seasons' growth; × 80 diameters.
34. *Cerasus domestica* (Cherry), showing structure, and union of two seasons' growth; × 40 diameters.
35. The same, longitudinal radial section, showing medullary plates; × 80 diameters.
36. *Clematis vitalba* (Traveller's Joy), showing structure of one year's growth, including bark and pith; × 35 diameters.
37. The same, showing the tissue; × 200 diameters.
38. *Berberis vulgaris* (Barberry), showing vasa, tissue, and rays; × 80 diameters.
39. *Mahonia aquifolia* (Mahonia), showing first year's growth, bark, woody fibre, and pith; × 80 diameters.
40. *Populus monilifera* (Black Italian Poplar), showing vasa, rays, tissue, and union of two seasons' growth; × 80 diam.
41. *Salix alba* (Willow), showing vasa, rays, tissue, and union of two seasons' growth; × 80 diameters.
42. *Castanea vesca* (Spanish Chestnut), showing vasa, rays, tissue, and union of two seasons' growth; × 80 diam.

43. *Robinia Pseud-Acacia* (False Acacia), showing vasa, tissue, and union of two seasons' growth ; × 80 diameters.
44. *Fagus sylvatica* (Beech), showing vasa, rays, tissue, and union of two seasons' growth ; × 40 diameters.
45. *Ulmus effusa* (Elm), showing vasa, rays, tissue, and union of two seasons' growth ; × 40 diameters.
46. *Ulmus montana* (Wych Elm), showing vasa, rays, tissue, and union of two seasons' growth ; × 40 diameters.
47. *Ulmus campestre* (English Elm), showing vasa, rays, tissue, and union of two seasons' growth ; × 40 diameters.
48. *Sambucus nigra* (Elder), showing vasa, rays, tissue, and union of two seasons' growth ; × 40 diameters.
49. The same, showing pith cells ; × 80 diameters.
50. *Ulex europœa* (Whin), showing tissue, vasa, rays, and union of two seasons' growth ; × 40 diameters.
51. *Hedera Helix* (Ivy), showing vasa, rays, tissue, and annual rings ; × 40 diameters.
52. *Lagetta lintearia* (Lace-bark Tree), showing vasa, rays, tissue, and annual growth ; × 40 diam.
53. *Ribes nigrum* (Black Currant), showing vasa, rays, tissue, and annual ring ; × 40 diameters.
54. *Lonicera Periclymenum* (Honeysuckle), showing vasa, rays, tissue, and annual ring ; × 40 diameters.
55. *Sophora japonica*, showing vasa, rays, tissue, and annual ring ; × 40 diameters.
56. *Rubus fruticosus* (Bramble), showing pith of one year old wood ; × 200 diameters.
57. The same, showing wood and bark ; × 200 diameters.
58. *Genista anglica* (Petty Whin), showing vasa, rays, tissue, and annual ring ; × 40 diameters.
59. *Theophrasta imperialis*, showing peculiar cellular tissue, vasa, and medullary rays ; × 60 diameters.
60. *Ampelopsis hederacea* (Virginian Creeper), showing one year's growth, pith, vasa, rays, tissue, and bark ; × 80 diameters.
61. *Bambusa Metake* (Bambco), showing the peculiar structure of the wood of endogens.

HIGHLY MAGNIFIED

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

By D. F. MACKENZIE, *Factor*, Mortonhall.

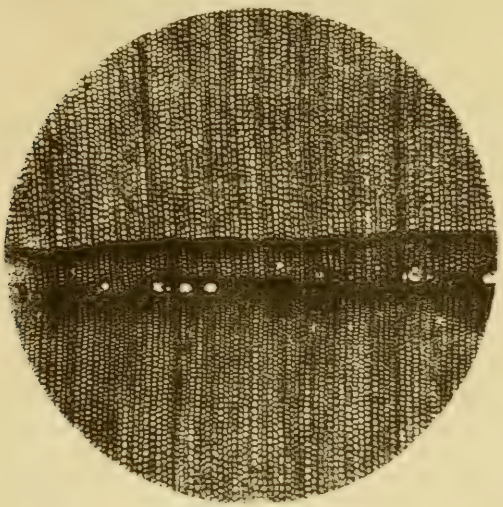


Fig. 1.

Abies excelsa. Norway Spruce.

Trans. Sect. × 40.

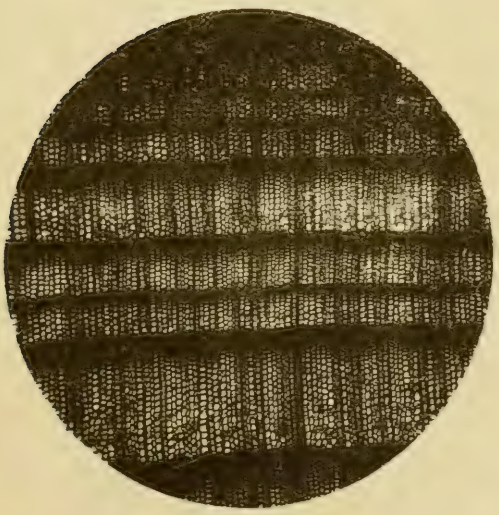


Fig. 2.

Abies pectinata. Silver Fir.

Trans. Sect. × 40.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

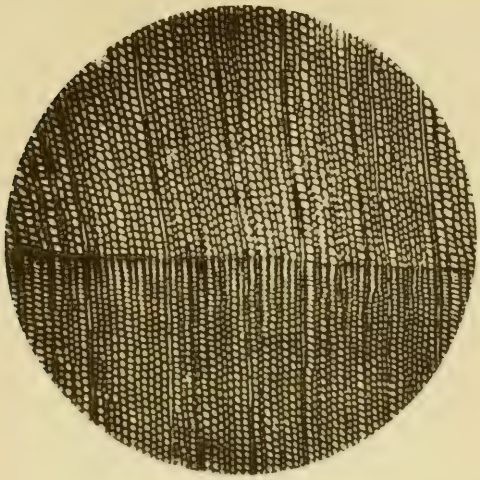


Fig. 3.

CEDRUS ATLANTICA. Cedar.

Trans. Sect. × 40.

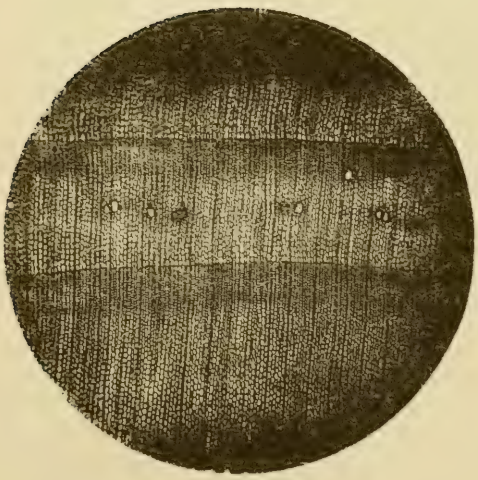


Fig. 4.

LARIX EUROPÆ. Larch.

Trans. Sect. × 40.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

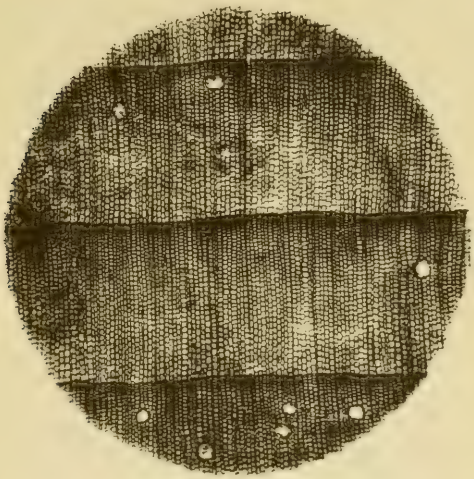


Fig. 5.

PINUS LARICIO. Corsican Pine.

Trans. Sect. × 40.

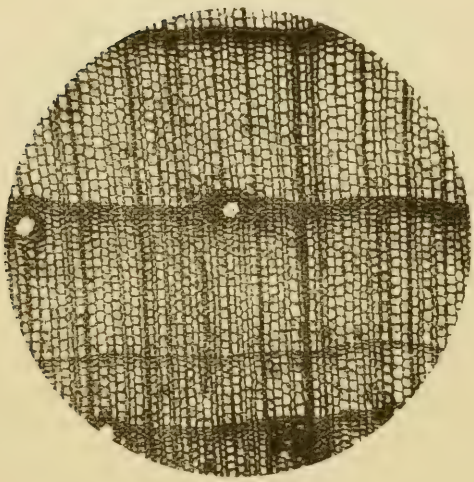


Fig. 6.

PINUS SYLVESTRIS. Scots Pine.

Trans. Sect. × 40.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

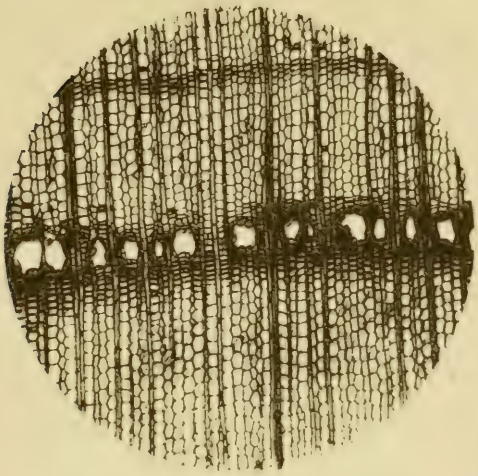


Fig. 7.

WELLINGTONIA GIGANTEA.

Trans. Sect. × 40.

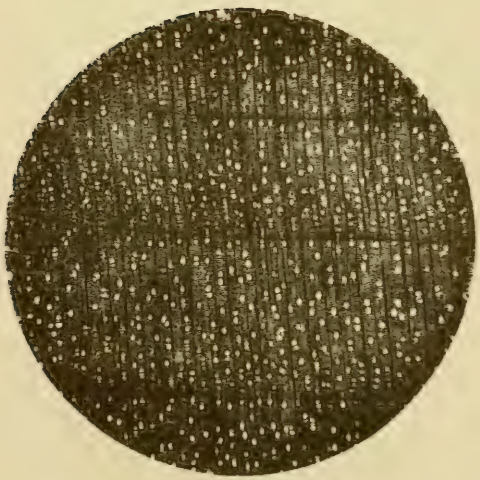


Fig. 8.

ACER CAMPESTRE. Maple.

Trans. Sect. × 40.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

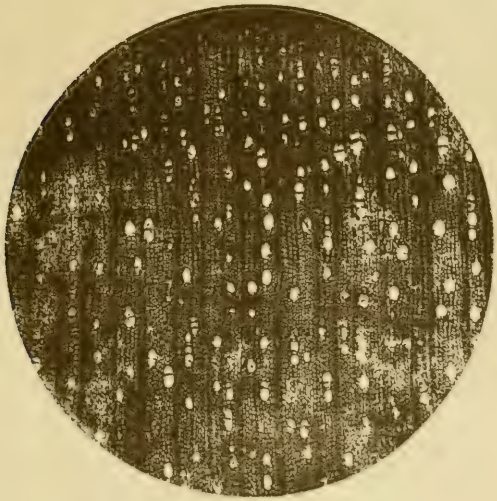


Fig. 9.

ACER PSUEDO-PLATANUS. Sycamore.

Trans. Sect. × 40.

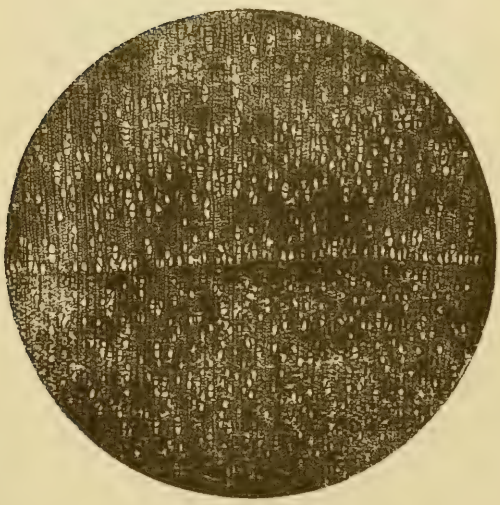


Fig. 10.

ÆSCULUS HIPPOCASTANUM. Horse Chestnut.

Trans. Sect. × 40.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

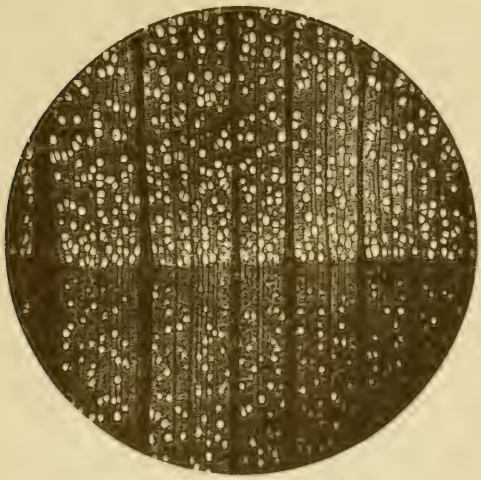


Fig. 11.

FAGUS SYLVATICA. Beech.

Trans. Sect. × 40.

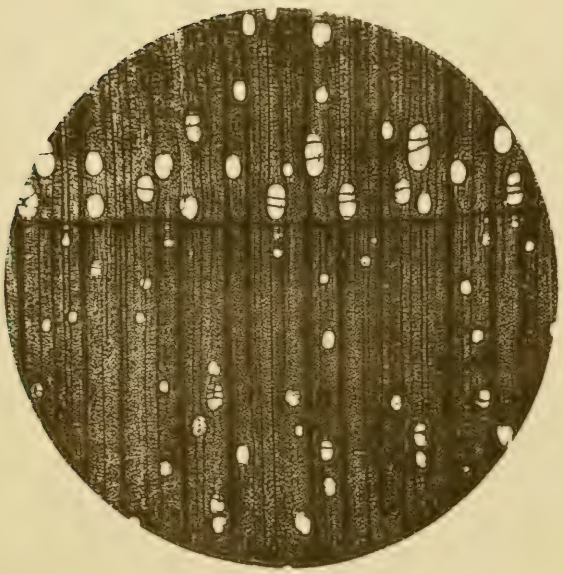


Fig. 12.

JUGLANS NIGRA. Walnut.

Trans. Sect. × 40.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

Fig. 13.

LONICERA PERICLYMENUM. Honeysuckle.

Trans. Sect. × 40.

Fig. 14.

POPULUS MONILIFERA. Poplar.

Trans. Sect. × 80.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

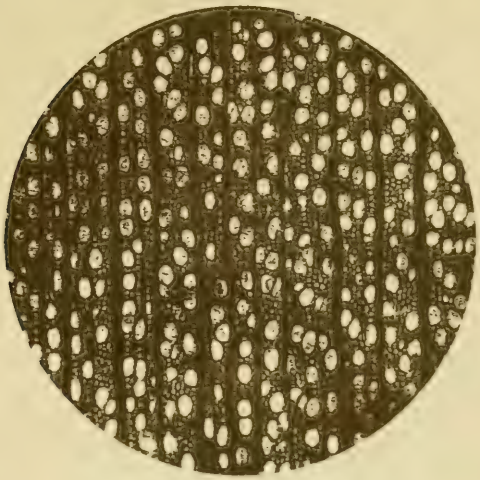


Fig. 15.

PYRUS COMMUNIS. Pear Tree.

Trans. Sect. × 30.

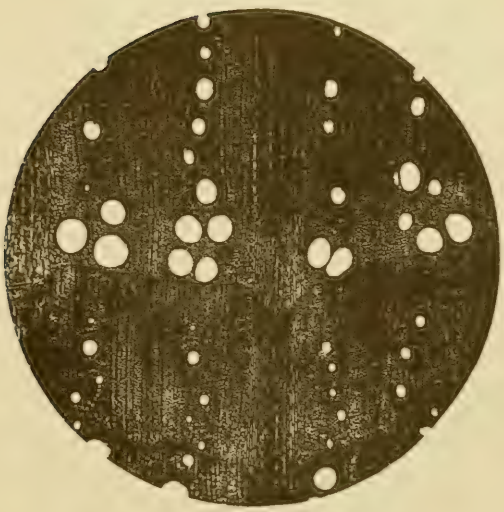


Fig. 16.

QUERCUS CERRIS. Turkey Oak.

Trans. Sect. × 40.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

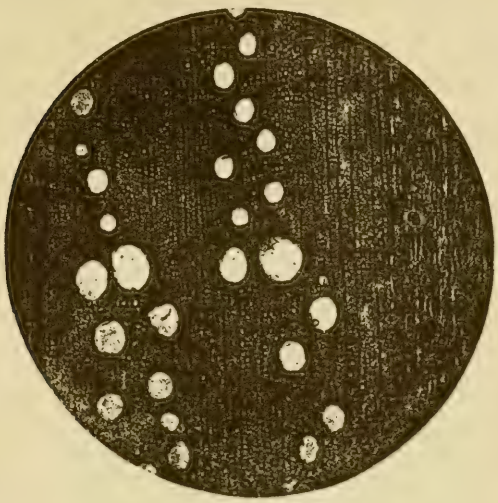


Fig. 17.

QUERCUS ILEX. Evergreen Oak.

Trans. Sect. × 40.

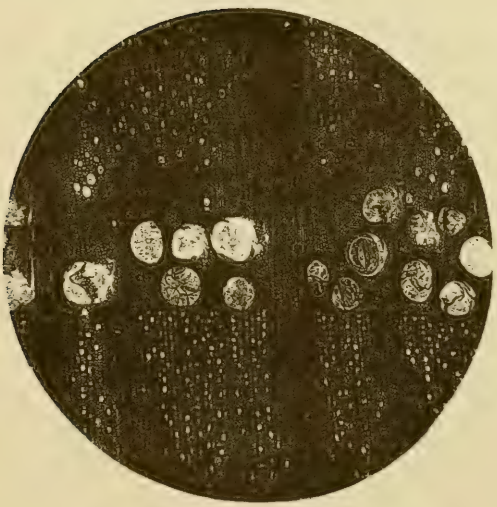


Fig. 18.

QUERCUS ROBUR. British Oak.

Trans. Sect. × 40.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

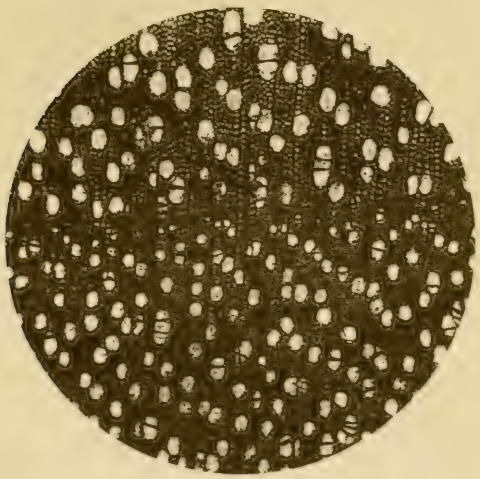


Fig. 19.

SALIX ALBA. Willow.

Trans. Sect. × 80.

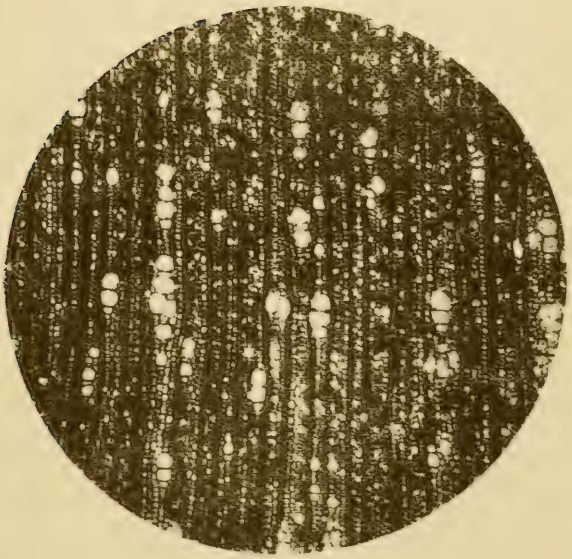


Fig. 20.

THEOPHRASTRA IMPERIALIS.

Trans. Sect. × 40.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

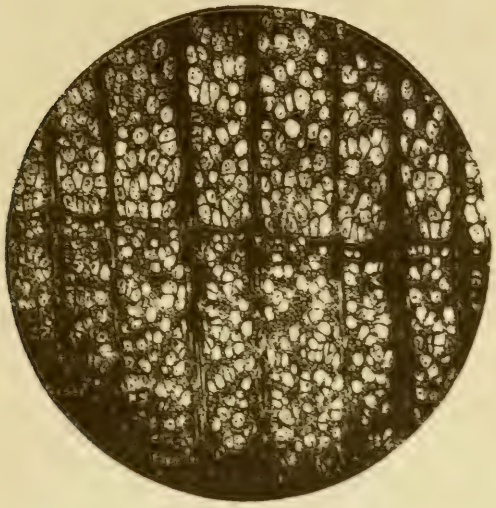


Fig. 21.

TILIA GRANDIFOLIA. Lime Tree.

Trans. Sect. × 40.

Fig. 22.

ULEX EUROPÆUS. Whin.

Trans. Sect. × 40.

MICRO-PHOTOGRAPHS OF SECTIONS OF WOODS.

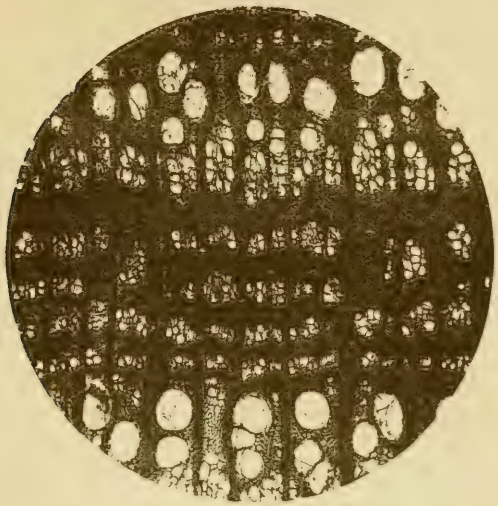


Fig. 23.

ULMUS CAMPESTRE. English Elm.

Trans. Sect. × 40.

Fig. 24.

ULMUS MONTANA. Scots Elm.

Trans. Sect. × 40.

Royal Scottish Arboricultural Society.

EXCURSION

TO THE

ROYAL DOMAIN AND FOREST OF WINDSOR;

CLIVEDEN, DROPMORE, AND BURNHAM BEECHES;

THE NEW FOREST;

THE ROYAL GARDENS, KEW;

THE FORESTRY EXHIBITION, LONDON;

AND HATFIELD.

1893.

WINDSOR CASTLE FROM THE THAMES.

ROYAL
SCOTTISH ARBORICULTURAL SOCIETY.

EXCURSION, 1893.

FIRST DAY.

Monday, 7th August.

EDINBURGH, *vid* CARLISLE AND LONDON, TO WINDSOR.

The Council of the Society having resolved to hold the Sixteenth Annual Excursion in the South of England, arrangements were made for the members to visit the Royal Domain at Windsor, Berks, on the 8th of August; the estates of Cliveden, Dropmore, and Burnham Beeches, Bucks, on the 9th; the New Forest, Hants, on the 10th and 11th; and the Royal Gardens at Kew, and the Forestry Exhibition, London, on Saturday the 12th, where it was intended the Excursion should terminate. An opportunity was, however, afforded, which was taken advantage of by a large party of the members, to visit, on Monday the 14th August, the Marquis of Salisbury's estate at Hatfield, Herts.

With so many and varied attractions to the forester and the lovers of woodland scenery of the richest description, the Excursion was very largely patronised by the members of the Society from all parts of the United Kingdom. It presented a rare opportunity to those from Scotland and the northern districts of England for viewing, under favourable circumstances, some of the most ancient forests in the South of England, and for studying the growth of the indigenous oak, beech, elm, and ash in their native habitat, with that of exotic trees of remote and recent introduction alongside of them. In Windsor Forest, as well as in the New Forest,

there are still to be seen many ancient woodland monarchs of Nature's own rearing; while near them, and growing with equal luxuriance, are the larch and silver fir of Central Europe, and the Norway spruce and Scots pine of more northern latitudes, all of which are introductions by man to this part of England, and all, except the Scots pine, exotics in the British Isles. To these have been added in later times the finest of the hardy trees culled from the forests of the world. Within the district visited many of these exotics found their earliest home in Britain, particularly those known as the "Newer Coniferæ"—some of the first introduced and finest specimens of them in the kingdom being at Dropmore, one of the estates inspected. It was, therefore, evident that this Excursion promised to be most instructive as well as exceedingly interesting to arboriculturists from northern parts, and with the weather highly favourable for the work in hand, it turned out to be among the most successful of all the Excursions carried out by the Society.

The Fortieth Annual General Meeting of the Society was held on Monday, 7th August, at 11.30 A.M., at 5 St Andrew Square, Edinburgh, when the President, Professor I. Bayley Balfour, delivered an able and instructive address, which appears in the *Transactions;* office-bearers and 85 new members were elected, and the general business disposed of for the Session.

After the meeting closed, the members joining the Excursion at Edinburgh mustered at the Princes Street Station of the Caledonian Railway at 1.45 P.M., and took their seats in a special train of saloon carriages which was provided by the West Coast Route Companies for the railway journey, *viâ* London and Windsor, to Southampton, and back to Edinburgh. Members, as usual, wore the badge of the Society—a sprig of Scots Fir—so that they might be easily recognised as belonging to the party. This was more necessary than ever on the present occasion—so large was the party, and so many new members among them.

The Excursion started about 100 strong from Edinburgh, and, like the river on its way to the ocean, it was constantly augmented by additions from various Scottish and English districts, until, on mustering at Windsor, it included no fewer than 150 members of the Society, among whom were the following gentlemen:—C. Adamson, Leven, Fife; John F. Annand, Edinburgh; Lieut.-Col. Bailey, R.E., Lecturer on Forestry, Edinburgh University; James Barrie, Stevenstone, Devon; James Barton, Hatfield,

Herts; Robert Baxter, Dalkeith Park; James Berry, Berwick-on-Tweed; Andrew Boa, Dalton, Newcastle; Andrew Boa, jun., Great Thurlow, Suffolk; Professor Geo. S. Boulger, London; Alexander Brownlie, Earlston; T. R. Bruce, Dalshangan, Dalry, Kirkcudbrightshire; Charles Buchanan, Penicuik Estate, Midlothian; George Cadell, Secretary, Forestry Exhibition, London; Robert Cairns, Dunfermline; Alexander Campbell of Auchindarroch, Lochgilphead; W. C. Carnegie, Sarsden, Chipping-Norton; Christopher Chouler, Dalkeith Park, Midlothian; A. D. Christie, Ragley Hall, Alcester, Warwickshire; Charles Clark, Cawdor, Nairn; William Clark, Edinburgh; Phillip Cockburn, Dalkeith; Ernest Collins, Lilleshall, Newport, Salop; Frederick Collins, Trentham, Stoke-on-Trent; R. T. Collins, Trentham, Stoke-on-Trent; Alfred Cook, Empingham, Stamford; James Cook, Arniston, Gorebridge; Bernard Cowan, South Shields; R. W. Cowper, Sittingbourne, Kent; John Craig, Dalkeith; W. S. Curr, Prestonkirk; J. R. L. Daish, Edinburgh; A. S. Donald, Thirladean, Selkirk; Robert Douglas, Edinburgh; J. W. Duncan, Broughty Ferry; P. J. Duncan, Broughty Ferry; Malcolm Dunn, Dalkeith; William Erskine, Edinburgh; A. J. Farquharson, Newtyle, Forfarshire; Rev. H. Fleming, Mordington Manse, Berwick-on-Tweed; Frederick Foreman, Eskbank, Dalkeith; A. C. Forbes, Bowood, Calne, Wiltshire; Robert Forbes, Clova Lumsden, Aberdeen; James Forgan, Bonskeid, Pitlochry; James Forgan, Sunnybraes, Largo, Fife; William Forgan, Lynedoch, Perth; Robert Galloway, Edinburgh; W. M. Gilbert, Edinburgh; Wm. Gilchrist, Leuchars, Elgin; George Goldie, Eskbank, Dalkeith; Archibald Gorrie, Brookman's Park, Hatfield, Herts; G. H. Gorrie, Dalkeith; William Gough, Wykeham, York; John Gow, Edinburgh; Peter Grant, Panmure, Carnoustie, Forfarshire; W. A. Greenfield, Winchburgh, Linlithgowshire; Charles Hankins, Grimsthorpe, Bourne, Lincolnshire; W. B. Havelock, Duncombe Park, Helmsley, Yorkshire; Robert Henderson, Penicuik; William Henderson, Balbirnie, Fife; Frank Hull, Lilleshall, Newport, Salop; George Jack, Dalkeith; Henry Jonas, Whitehall, London; James Kay, Rothesay, Bute; John Kennedy, Appleby; John Kerr, Yorkston, Gorebridge; R. D. Ker, W.S., Edinburgh; J. B. Kidd, Dunrobin, Sutherland; D. P. Laird, Edinburgh; Robert Lindsay, Edinburgh; Alexander M'Crae, Leven; Major MacGregor, Penicuik; J. W. M'Hattie, Stratfieldsaye, Hants; D. F. Mackenzie, Morton Hall, Midlothian;

W. A. M'Kenzie, Brodick, Arran; David M'Kinlay, Bedwell Park, Herts; Geo. M'Kinnon, Melville Castle, Lasswade; Wm. M'Kinnon, Edinburgh; Major Neil MacLeod, R.H.A., Dalkeith; Jas. M'Leod, Dover House, Roehampton; A. M'Rae, Market Drayton, Salop; John Methven, Edinburgh; John Michie, Balmoral; J. J. W. Miller, Hatfield, Herts; J. Mills, London; J. K. Milne, Lasswade; Alexander Milne, Edinburgh; Wm. Milne, Foulden, Berwick-on-Tweed; F. Mitchell, Harlestone, Northampton; W. J. Moffat, *Secretary*, Edinburgh; Malcolm Morgan, Crieff; Provost Murdoch, Dalkeith; John Murdoch, Eskbank, Dalkeith; A. D. Page, Culzean, Maybole; Walter Page, Myregornie, Kirkcaldy; C. M. Patterson, Newbattle, Dalkeith; Andrew Peebles, Albury, Guildford, Surrey; Alex. Pitcaithley, Sudbourne Hall, Wickham Market, Suffolk; G. H. Potts, Lasswade; Wm. Priest, Eglinton, Ayrshire; Wm. Proudfoot, Raith, Kirkcaldy, Fife; Rev. John Reid, Foulden Manse, Berwick; A. D. Richardson, Edinburgh; Donald Robertson, Novar, Evanton, Ross-shire; John Ross, Hopetoun, Queensferry, Linlithgowshire; James Rutherford, Kirkleatham, Redcar, Yorks; J. A. Rutherford, Newbury, Berks; Edmund Sang, Kirkcaldy; A. Scott, Southwick Park, Fareham, Hants; J. Scott, Newbury, Berks; Andrew Shaw, Perth; Wm. Shaw, Ballingry, Fife; John Smith, Romsey, Hants; Wm. Smith, Edinburgh; Richard Stewart, Trentham, Stoke-on-Trent; Robert Storie, Dalkeith; James Tait, Penicuik; James Terras, Blairadam, Kinross; Alex. Thomson, Trinity Grove, Edinburgh; Andrew Thomson, Trinity Grove, Edinburgh; D. W. Thomson, Edinburgh; Robert Thomson, Granton, Edinburgh; W. Tomlinson, Clumber, Worksop, Notts; H. E. Underwood, Farnham, Bury St Edmunds, Suffolk; A. Waddell, Leven, Fife; John Walker, London; Robert Wallace, Edinburgh; James Watt, J.P., Carlisle; James W. Watt, Carlisle; John Watson, Edinburgh; J. W. Weddell, Lauder Barns, Berwickshire; George Williamson, Leven; Alex. Williamson, Edinburgh; and J. J. Wilson, Penicuik.

The special train left Edinburgh at 1.55 P.M., and travelling southwards for a few miles through a well-cultivated district, the uplands were reached soon after passing West Calder. A bare, bleak country prevails till the Clyde is approached at Carstairs, and running up the strath, which for a few miles is tolerably well wooded; cultivation and woodlands gradually disappear as the route penetrates the defiles of the Lowther Hills. The narrow

glens and green hillsides through which the route passes for many miles present an ever-varying scene of great beauty to the traveller, which, in the eyes of an arborist, would be greatly enhanced by judicious planting. Nearing Beattock, the summit of the railway is reached at about 760 feet above sea-level, and the great watershed of the rivers in the south of Scotland is passed. Here are—

> "The upland moors, where rivers here but brooks
> Dispart to different seas."

The sources of the Annan, the Clyde, and the Tweed lie within sight, and the rivers flowing in diverse directions pour their waters into the seas on the south, west, and east of Scotland. After parting with the last brooklet of the Clyde, which has been followed to its source, the tiny Evan is seen creeping into sight as rapidly as the Clyde had disappeared. When Beattock was left behind, a fine view of Moffatdale opened on the left, with Moffat Spa, the "Cheltenham of Scotland," in the near distance, surrounded by romantic scenery of the wildest nature, amid which many thrilling events occurred in the days of the Covenanters. In the upper recesses of the dale lie dark Loch Skene, and the far-famed waterfall, the Grey Mare's Tail, a stupendous cascade of over 400 feet in height, among scenery of the most savage grandeur. To quote the impressive words of the Wizard of the North—

> "There deep, deep down, and far within,
> Toils with the rocks the roaring linn,
> Then, issuing forth one foaming wave,
> And wheeling round the Giant's grave,
> White as the snowy charger's tail
> Drives down the pass of Moffatdale."

Onward the route lies down Annandale, through a beautiful and well-wooded landscape, past many comfortable-looking homesteads and well-cultivated fields, especially in the neighbourhood of Lockerbie, at a short distance from which, on the right, is seen the ancient royal residence, Lochmaben Castle, in a rich landscape environment of wood and water. Passing on, every part of the land as we near the Border is rich in legend and stirring tales of daring and adventure in early times. Among the curious customs that have passed away, and which made one spot in this part of the Borders particularly famous, were the celebrated marriages at Gretna Green, a village near the last station we pass before entering

England, it being the first place reached by runaway couples from the south where they could get the nuptial knot legally tied.

Crossing the small river Sark we are on English ground, and the railway sweeping round the head of the Solway Firth through a flat but pleasing landscape, Carlisle was reached about 4 o'clock. Southward from Carlisle the route lies through a fine stretch of grazing and agricultural country, with the Cumberland Fells occupying the background. The thriving town of Penrith, with its ancient castle, the remains of which are seen close to the railway station, is situated about 18 miles from Carlisle. About 3 miles farther on the line passes on the right Lowther Castle, in Westmoreland, standing in the midst of an extensive and richly-wooded domain, the scene of the first Excursion of the Society across the Border. The railway is now rapidly ascending to the watershed of the Fells, and reaches the highest point, about 1000 feet, on the route between Edinburgh and London, near Shap, about 12 miles south of Penrith. The country is picturesque and wild, but the prevailing feature of the beautiful dales that the line traverses, and which stretch far into the distance on either side between the precipitous Fells, is the fresh verdancy of their rich pasturage, on which graze the numerous herds of well-bred cattle for which the dales are celebrated. Birbeck Dale and Lune Dale are traversed in succession till Tebay Junction is reached on the confines of Yorkshire, where the line makes a deep bend to the right among the hills into the Kendal district, and pursuing its course almost due south, enters Lancashire near the head of Morecambe Bay, which lies on the right, backed on the north by the hills of the Lake District. Soon Lancaster and its ancient castle, the stronghold of John of Gaunt, now modernised and used for county purposes, are passed, and the route lies through a rather level and uninteresting country till Preston was reached at 6 o'clock, where dinner was served to the company in their carriages.

Leaving Preston, the route lies through a busy and populous district, where mining and manufacturing are the chief industries, and where arborescent vegetation is seen in most parts struggling for a miserable existence in the murky and polluted atmosphere. Crossing the Mersey at Warrington into Cheshire, and leaving the factories and coal-pits behind, the landscape rapidly improves as the line runs up the valley of the Weaver, through the rich pastures of the "Wich," or salt district of Cheshire, till Crewe is

reached at 7.25 P.M. A few miles farther Staffordshire is entered, and away on the left for many miles stretches the great North Staffordshire mining district, and the far-famed Potteries, of which Stoke-on-Trent is the centre. Approaching Stafford, the landscape assumes a more pleasing aspect, and as we have now reached the middle of England, the scenery is of a thoroughly southern type. Many extensive domains and ancestral mansions are seen, close to the route or in the distance, as the train hurries past, and the country generally has a comfortable and well-clothed appearance. After passing Stafford, the line skirts the northern edge of the ancient forest of Cannock Chase, a wild moorish upland, the highest tableland in England, extending to about 25,000 acres, which, formerly covered with wood, is now generally bleak and bare, though in places very rich in minerals, and a busy centre of mining industry. The Trent is crossed at Colwich, and its northern bank followed for a few miles past Rugeley, when it is recrossed and left behind on the way to Lichfield. Away on the left as we pass Rugeley, and lying in the great bend of the Trent where it turns north-eastward, is the ancient royal forest of Needwood, which formerly extended to about 90,000 acres, but is now all enclosed, and mostly under cultivation. Oak predominated in this forest, and many fine trees still remain, especially in Bagot's Wood. The famed Swilcar Oak, the "Monarch" of Needwood, is said to be at least six centuries old, and girths 21 feet at 5 feet up.

After passing Lichfield, the bosky hedgerows, thickly studded with tall stately elms, the rich meadows, and well-tilled fields of the Midlands, form a charming landscape, and present an attractive view of English rural life. At Tamworth the line enters Warwickshire, and runs through a rich level country with a beautifully wooded landscape, till it passes into Northamptonshire about 3 miles beyond Rugby. Traversing the southern part of that county for about 20 miles, and just before leaving it, the Royal Forest of Salcey, 1847 acres, chiefly occupied with oak for naval purposes, is seen on the left, while away in the opposite direction to the right lies the wide tract of Whittlebury Forest, in which the beech gains the ascendency, and maintains it throughout Buckinghamshire, which we next traverse. On the eastern confines of Bucks, on the right of the line, stands Mentmore, the princely seat of the Earl of Rosebery; and from this point, all the way through Herts and Middlesex to London, is a succession of the mansions,

parks, and gardens of the wealthy, which form a conspicuous feature of the country within a forty-mile radius of the Metropolis. Darkness had set in before we reached Middlesex, and nothing could be seen of the landscape for the remainder of the journey to Windsor. The outskirts of London were reached at Willesden about half-past eleven o'clock, and the train, crossing the west end of London by Acton and Kew, travelled up the valley of the Thames, *viâ* Richmond and Staines, to Windsor. The "White Hart" Hotel, the headquarters of the Society, was reached a little before one A.M. — considerable delay having taken place at Willesden, and on the short journey to Richmond, on account of the Bank Holiday traffic. Here previous arrangements had been made by the Secretary for the accommodation of every member of the numerous party, so that all were made comfortable without confusion at the late hour of arrival.

SECOND DAY.

Tuesday, 8th August.

WINDSOR CASTLE, GARDENS, FARMS, PARKS, AND FOREST.

It was a glorious morning when members turned out upon the chief street of the royal borough for an early promenade to take the stiffness out of their joints after the long railway journey of the previous day. The weather was of the most delightful character. It was stated to the members by some of the residents, that in this district of England scarcely a drop of rain had fallen for nearly two months. The ground and all field and garden crops were suffering for want of moisture: but, while sympathising very much with the sufferers from such a state of things, it was secretly hoped that the drought and sunshine might hold as long as the Excursion was in the South of England. This it did. The heat during the week was intense; but it was dry, and finer weather for the great amount of out-of-door work which was gone through could not have been wished.

Seldom has an Excursion been entered upon in higher spirits

by the members. Windsor Castle, the home of kings—cradle of the Royal race of England—was to be visited, and by many of the company for the first time. Loyalty welled up in every heart, and it would not have surprised anyone to see the members gathering in a ring round the Jubilee Statue of Her Majesty, and lustily singing, "God Save the Queen." For we could not forget—we members of the Royal Scottish Arboricultural Society—that Her Most Gracious Majesty, who is Patroness of the Society, has on more than one occasion shown great interest in its objects. In the Jubilee year the members had the privilege accorded to them of spending two days in the Royal Forests at Balmoral. On the present occasion Her Majesty, through Sir Henry Ponsonby, not only graciously acceded to the request of the Society to be allowed to visit Windsor Castle, the gardens, and forests; but was pleased also to express her desire that the members should see the Royal farms, parks, and other objects of interest with which the Royal Domain so richly abounds.

Windsor Castle.

After breakfast a start was made at 8.30 A.M. prompt, so that all the most interesting objects in the Royal Domain might be seen within the day. It had been arranged that Windsor Castle was to be first visited, and fully a couple of hours were required to give even a glance at the multitude of objects of interest in and around the Royal residence. To mention only a few that are usually seen by the public, viz., the State Apartments, comprising a magnificent suite of some seventeen rooms; St George's Chapel, the Albert Memorial Chapel, the Round Tower, and the Curfew Tower—each the centre of many historic incidents, and stored with the best that art and wealth can produce—these alone would be sufficient to occupy a long day to examine them, with even a superficial glance at details. The inspection, therefore, of the Albert Memorial Chapel and of St George's Chapel were postponed until the next morning, so that more time could be devoted to-day to the inspection of the grounds, gardens, farms, parks, and woodlands.

The members were met at the entrance to the Castle by Mr Leonard Collmann, Inspector of the Palace, who personally conducted the party over the Royal Mews, or stables, with

accommodation for about 120 horses and 40 carriages; and the Private and State Apartments of the Castle. These have been so frequently described and are so well known, that a lengthy description of them is not needed, but a few of the leading features may be here noticed. The Castle dates from the era of the Norman invasion, William the Conqueror erecting a stronghold on the commanding site the Castle occupies, soon after he assumed the sovereignty of the kingdom. The name Windsor, derived from *Windleshora*, the Saxon term for "winding banks," is fairly descriptive of the site on the undulating banks overlooking the rich valley through which the river Thames meanders. The Castle was mentioned in Domesday Book in 1086, but none of the original Norman structure is now distinguishable, if any exists. The present edifice was commenced by Henry I. about 1107, but little is known of its history till the reign of Edward III., 1327-77, who rebuilt almost the whole of it, under the superintendence of the celebrated Bishop of Winchester, William of Wykeham. The Round Tower is supposed to date from this king's reign, who also built St George's Chapel, and instituted the Noble Order of the Garter. Many additions and improvements have been made by succeeding monarchs, especially by George IV., from designs by Sir Jeffrey Wyatville, and Her Majesty the Queen, till the Castle has assumed its present noble dimensions and stately grandeur, so beautifully delineated in the frontispiece.[1] It may also be mentioned that King John lay here in 1215, while negotiating with the Barons assembled at Runnymede, a few miles off, the terms of Magna Charta. At the end of the 14th century the poet Chaucer resided in the Winchester Tower. Queen Elizabeth formed the terraces; and the Castle was plundered in the time of the Commonwealth. Grinling Gibbons, who died in 1721, was the carver of the numerous floral wreaths and festoons seen in the principal rooms; and Antonio Verrio, 1639-1707, was the painter of many of the richly-decorated ceilings, most of which are still as fresh and clear as when they left the painter's brush.

Before entering the Castle to view the apartments, the members of the party were each courteously presented by Mr Collmann with

[1] The Society is indebted to the kindness of Dr Maxwell T. Masters, Editor of the *Gardeners' Chronicle*, London, for the use of the beautiful series of engravings which illustrate this Report.

a copy of a brochure written by himself, for private circulation only, in which the chief features of interest in the Royal and State Apartments were concisely and lucidly described. This timely and very acceptable gift was of great service to the members in their walk through the various rooms in the Castle, and will be treasured by them among the souvenirs of their visit to Windsor. In it are noticed the most famous of the collections of rare and valuable works of art in the Royal Castle, among which are the oil paintings by the distinguished masters—Rubens, Vandyck, Zuccarelli, Canaletto, Sir Joshua Reynolds, Gainsborough, Hogarth, Sir Thomas Lawrence, Sir David Wilkie, Sir George Hayter, and many other eminent artists—miniatures, drawings, engravings, books and manuscripts, old china, bronzes, armour and arms, ancient tapestry, French and English furniture, rich cabinets, and gold plate, the last alone being estimated to be worth the sum of £1,800,000. Only a very cursory inspection could be made of what was seen of these wondrous collections, the greatest interest being taken in the portraits of the reigning Royal Family, and in those of the famous warriors in the Waterloo Chamber.

It was not easy to tear ourselves away from the State Apartments, with all their wealth of historical associations, their beautiful pictures, tapestries, carvings, and *faïence*, but only a limited time could be given to an inspection of them, in view of the extended programme of the day, which had just been begun. It may be permissible to say, however, that as good Scotsmen, the visitors were much interested to notice in St George's Hall, amid the banners and insignia of the Knights of the Garter, a chair made from a beam of "Alloway's Auld Haunted Kirk," with Burns's poem of "Tam o' Shanter" engraved on the back of it upon brass panels.

The Round Tower.

The party afterwards had the privilege of climbing to the top of the Round Tower, which is the oldest part of the Castle buildings now extant. The Tower has a diameter of 101 feet, with the top rising to about 350 feet above the level of the Thames, and from such a grand standpoint twelve counties are said to be visible on a clear day. On this particular forenoon a slight haze

obscured the far distance, but nevertheless the views which lay before us were of the most charming character. A fair, well-wooded landscape, soft and sweet in all its features, spread itself out in the sunshine, with here and there a mansion-house, church-spire, village, or prosperous little town rising amid the foliage of trees to give life and variety of interest to the scene. Several gentlemen connected with the Castle accompanied the party to the top of the Tower, and kindly pointed out to them the more prominent and interesting places and objects which were discernible from that elevated spot. To the north, and just across the Thames, lay the town of Eton, with its cluster of old colleges; and away over the green "playing fields" beyond it was seen a well-wooded country, with the white mansion of Stoke Park conspicuously glittering in the sunshine, near which is the famous ancient church and village of Stoke Pogis, where the poet Gray wrote his "Elegy." A little to the east were seen in the distance the Chiltern Hills; and away to the eastward the eye strove to catch a glimpse of the City of London beneath the canopy of overhanging smoke, or to determine the whereabouts of Hampton Court in the hazy landscape. Nearer at hand and to the southward lay the heath-clad Surrey Hills, with many wooded dells and bare commons; while immediately beneath the eye, and spreading out before us, were the grand avenues, drives, and wide expanses of pasture which form the Royal Domain, stretching away towards Ascot and Virginia Water on the southern confines of the Great Park and the Royal Forest of Windsor. Among the most interesting of all the spots to which attention was called while the company were on the top of the Tower, were Runnymede, and Magna Charta Island, on the latter of which King John signed the Great Charter on the 25th of June in the year 1215. The island stands in the Thames towards the Bucks shore; and Runnymede is a level strip of land nearly 2 miles in length lying along the Surrey bank of the river.

The Terraces and Flower Garden.

Leaving the Tower, and passing out of the Castle yard on to the Grand Esplanade of the North Terrace, the party were taken in charge by Mr Owen Thomas, the Queen's Gardener, who ably conducted them over the whole of the extensive ornamental grounds

gardens, and orchards lying between the Castle and Frogmore, about a mile away, where the extensive kitchen and fruit gardens are situated. The North Terrace, along which the party first proceeded, stretches from the Winchester Tower on the west to the Brunswick Tower on the east, a distance of about 620 yards, with an average breadth of about 10 yards, and the views from it on a fine day are only less wide and varied than those from the top of the Round Tower. Passing beyond the Brunswick Tower, the party were on the East Terrace, about 150 yards in length, running in front of the Queen's private apartments, and overlooking the beautifully designed flower-garden, laid out in a sunk area several acres in extent, and terraced all round. The various parterres were greatly admired by the members, being arranged with admirable skill and taste, and the brilliancy of the flower-beds toned down with charming effect by a free use of handsome and compact specimens of ornamental conifers, hollies, and other evergreens of the choicest kinds. The fine statuary placed at appropriate points, and the splendid fountain playing in the centre, with its spray sparkling in the sun, completed as fair a scene as eye could wish to look upon, and in perfect harmony with the Royal residence. A number of trees of some interest were seen in the immediate vicinity of the flower-garden—such as a Cedar of Lebanon, planted by the Prince Consort; a fine example of the Chinese *Kolreuteria paniculata*, about one hundred years old, and flowering freely; a giant Tulip-tree, said to be one of the largest in the country; a tall Locust-tree, *Robinia Pseudo-Acacia*, on which grows an immense bunch of mistletoe; and a grand *Paulownia imperialis*, laden with its beautiful panicles of flowers. Under the North Terrace of the garden is the Orangery, and at the east end of it is the Queen's Photographic Studio, a glass-fronted building, close by which is a rare yellow-berried thorn, *Cratægus tanacetifolia*, from the Levant, that attracted considerable attention.

Descending a staircase from the Terraces, the party proceeded along a shady gravelled walk on the eastern Slopes. Beeches, Oriental planes, and sycamores rose high over it, and afforded a grateful shade from the broiling rays of a tropical sun. It was stated that here upon wet days Her Majesty walks, or drives in her little donkey carriage, and a sweeter spot for such a purpose than these tree-shaded "Slopes" at Windsor could not be desired. After passing through a short tunnel lined with flints, the party

reached a charming rock-garden, formed upon the site of an old limestone quarry. Its quietude and retirement made it a favourite spot with the late Prince Consort; and it still holds a high place in Her Majesty's regard as a delightful summer retreat. On this broiling hot day the arbour did look so cool and inviting, as to tempt one to linger long in its pleasant shade. In our walk through this part of the Home Park, a few old oaks—dating from the days

QUEEN ELIZABETH'S OAK.

of the Normans, and of which the above illustration of Queen Elizabeth's Oak is a good example—were met with, and more were seen in other parts of the domain. Their glory has departed, but they are still wisely preserved as links connecting the present with the past. Had they but tongues to speak, what might they not tell of the stirring and historic events which have in the course of fleeting centuries been enacted under the shadow of their boughs. One of the largest of these old oaks was measured and was found to girth 36 feet. By the side of the walk is a

marble pillar, o'ergrown with ivy, on which is a tablet with the following inscription :—

Here is buried
DANDIE DINMONT,
for 13½ years
the faithful and favourite Skye terrier
of QUEEN VICTORIA.
Died Jan. 6, 1858.
Aged 19 years.

ADELAIDE COTTAGE.

The walk which the party had been traversing brought them to Queen Adelaide's Cottage, which is situated at the outer edge of

LUTHER'S BEECH.

the Slopes. It is a picturesque building, in a light style of architecture, with vine-clad trellises, now used by Her Majesty as a

tea-room. On the prettily diversified lawn in front of the Cottage is a famous beech tree, which has an exceedingly interesting history. It was raised from an old tree, called "Luther's Beech," which grew near Altenstein in the Duchy of Saxe-Meiningen, under which Martin Luther was arrested in 1521. The little offshoot was brought to England from Meiningen, in 1825, by King William IV. when Duke of Clarence, and was planted by Queen Adelaide in the grounds at their residence in Bushy Park, near Hampton Court, in Middlesex. Her Majesty bequeathed it in her will to H.R.H. Prince Albert, with the request that it might be transplanted to the enclosure at Adelaide Cottage. This operation was successfully conducted in 1850, and the tree has grown and flourished ever since. It is now about 75 feet in height, with a stem girthing 9 feet 2 inches at 5 feet up; and its free graceful habit and pleasing outlines are well shown in the illustration on the previous page. What makes the tree doubly valuable now is the fact that the original beech at Meiningen was destroyed by lightning in 1841. This "Luther's Beech" constitutes therefore a most interesting link between the present time and the days of the great German reformer. In the neighbourhood of the Cottage is seen another locust tree, with tufts of Mistletoe growing upon its branches. It may be of interest to state here that the Mistletoe is growing on the following trees, on the Slopes at Windsor Castle:—the Apple, Hawthorn, Hickory (*Carya alba*), Lime, Locust (*Robinia Pseudo-Acacia*), Maple, Mountain Ash, and American Walnut (*Juglans nigra*).

The Royal Kennels.

A little beyond Adelaide Cottage stand the Royal Kennels, where the Queen's fancy dogs are kept. Nearly every breed, British and foreign, is represented, and many of the pets are of much beauty. Special attention was directed to a couple of pure white collies, bred by Mr Charles, Warwickshire. The Skye, Irish, fox, and pug terriers, were also much admired. The arrangement and general tidiness of the kennels, and the fine exercising court for the dogs, greatly pleased the members of the company who had a taste for good fancy dogs, and an eye to their proper treatment.

The Home Park.

Passing round by a pretty group of cottages, the party crossed a portion of the Home Park, which was magnificently timbered.

This Park comprises about 500 acres lying between the Castle and the Thames, and is richly adorned with forest trees, the English elm and oak predominating. Not far from the Kennels stands one of the old Norman oaks, which measured 30 feet 5 inches in circumference at 5 feet up. Its bark was cork-like and corrugated, and parts of the hoary monarch were covered with zinc to keep out the wind and water. Standing not far from it was one of a lot of fine elms, with a fluted bole 20 feet in girth. Near the footpath between Frogmore and Datchet there stood till 1863, when it was blown down, the most famous of all the Windsor trees, "Herne's Oak," which Shakespeare in his *Merry Wives of Windsor* thus refers to—

> "There is an old tale goes, that Herne the Hunter,
> Sometime a keeper here in Windsor Forest,
> Doth all the winter time, at still midnight,
> Walk round about an oak, with great ragg'd horns;
> And there he blasts the tree, and takes the cattle;
> And makes milch-kine yield blood, and shakes a chain
> In a most hideous and dreadful manner.
> . . . . . .
> Marry, this is our device;
> That Falstaff at this oak shall meet with us,
> Disguised like Herne, with huge horns on his head."

A young oak has been planted by the Queen to mark the spot where grew for many ages this ancient monarch of the forest. A tablet affixed to the guard around it reads as follows:—"This tree was planted by Her Majesty Queen Victoria, Sept. 13, 1863, to mark the spot where Herne's Oak stood. The old tree was blown down, Aug. 21, 1863." At the time of our visit the tree was about 25 feet high, and in vigorous health. May the sapling flourish for many centuries, and record the gracious act through the far distant future.

Standing on this classic spot and gazing around us, we cannot but think of the wonderful comedy from which the above lines are quoted, and imagine whether Shakespeare himself ever stood where we do now, and saw the oak tree he has commemorated to all time in the strength of its might and luxuriance of foliage! Why not? He may have stopped here to gaze around him as we are doing on his way to Datchet, the scene of the ducking of the valiant Falstaff. The thought is at least worth cherishing, and makes the spot doubly attractive and interesting to all lovers of Shakespearian story. Looking about us, then, we see in the

immediate vicinity a number of remnants of oaks of the ancient Royal Forest. Many are far advanced towards decay. One or two still continue to throw out a few fresh shoots yearly, covered with green leaves, but for the most of them the sap will never more mount their dry and mouldering walls. With its bole stripped clean of every particle of bark, and with bare, horn-like branches twisted and contorted in the most fantastic manner, one of the oaks presented a weird and unearthly aspect. Another, not far from it, had assumed the shape of a huge Gothic gargoyle; and all indeed presented more or less a strangely fantastic aspect.

Frogmore.

Turning into the main drive, near a charming shrubbery in which a number of silver maples glistened in the sunlight amid the dark surrounding foliage, the company had next the privilege of walking through the beautiful grounds of Frogmore, to which ordinary visitors are only admitted once a year—on the 14th December, the never-to-be-forgotten anniversary of the death of the beloved Consort of Her Gracious Majesty. Frogmore was originally a part of the Royal Domain, but it seems to have been sold during the Civil War. It was repurchased by Queen Charlotte, the Consort of George III., and the lovely residence which now adorns the grounds was built for her by the architect Wyatville. The late Duke of Clarence was born here; and in later days it has been the home of the Princess Augusta, Queen Adelaide, the Duchess of Kent, the Prince and Princess of Wales, and the Prince and Princess Christian. It has always been a favourite retreat of Her Majesty, and it was within its quiet and peaceful grounds that the honoured remains of the Duchess of Kent and Prince Albert were laid to rest. The temple-like tomb of the former, and the noble mausoleum of Prince Albert, erected in 1862, in the Italian style, at a cost of £200,000, rise by the side of a pretty sheet of ornamental water in the centre of the grounds, and give a hallowed air of sanctity to the whole place. The party felt this as they wended their way through the charming grounds of Frogmore upon this lovely summer day, and inspected its wealth of arboreal beauty. The grounds are very picturesquely designed, and, needless to say, are kept in perfect order. There are smooth-shaven grassy glades and green lawns, charming flower-beds, pleasant walks

through the greenest of shrubberies, and numerous interesting and picturesque trees; while here and there are to be met with several examples of interesting ornamental buildings. One of these, a fine Indian kiosk from the Kaiserbagh at Lucknow, was sent home to Her Majesty, in 1858, by Earl Canning.

A number of the finest trees were the subjects of special inspection. On the right of the path leading to the Mausoleum are two thriving Wellingtonias which have an interesting history. One of these trees was originally planted by the Prince Consort, on the 5th June 1861, in the grounds at South Kensington, upon the occasion of the opening of the Royal Horticultural Society's Gardens, and was afterwards brought from London and planted by Her Majesty in its present site on December 17, 1869. At the same time a similar tree, first planted by the Queen in the same gardens on the 24th June 1861, was removed to the Mausoleum grounds and replanted by Her Majesty, but it unfortunately did not survive the transference, and on the 16th December following a fresh Wellingtonia took its place.

Among other trees specially noted in the Frogmore grounds were a deciduous Cypress, *Taxodium distichum*, with a grand bole of 8 feet in girth; an *Abies Pattoniana*, planted by the Queen of Denmark in December 1875; and an *A. lasiocarpa*, planted on the same date by the Princess Thyra of Denmark. A grand Cedar of Lebanon, standing near the door of the Mausoleum, has a splendid clean bole of 35 feet to the first branch, and at 5 feet up girths 10 feet 3 inches. A Maidenhair tree, *Salisburia adiantifolia*, had the respectable girth of 8 feet 9 inches, and was considered by many to be probably the finest example of this species growing in the country. There was also a fine *Libocedrus decurrens*, 55 feet in height and 8 feet 5 inches in girth, perfectly conical in its growth, and tapering straight from 30 feet in circumference at the base of the branches to a sharp point at the apex. It was planted by the Prince of Hohenlohe in 1857. The party inspected with reverent interest both mausoleums in this hallowed spot of English ground, and were much touched with the piety and affection of the Latin legend over the doorway of that of Prince Albert, which reads:—"His mourning widow, Victoria, the Queen, directed all that is mortal of Prince Albert to be placed in this sepulchre, A.D. 1862. Farewell, well-beloved! Here at last I will rest with thee; with thee, in Christ, I will rise again."

EVERGREEN OAKS IN THE HOME PARK.

The Queen's Breakfast-Room Cottage.

Proceeding onwards, we emerge from Frogmore grounds into the open park near to a delightful cottage with a high-pitched red-tiled roof, and having its walls beautifully clothed with climbing plants and flowers. This was pointed out to us as the favourite breakfast-room of the Queen. When residing at Windsor, Her Majesty nearly every morning walks from the Castle to this charming spot to breakfast. Hard by the Cottage were two remarkably fine specimens of the evergreen oak, *Quercus Ilex*. The one on the right of the illustration, on the opposite page, was measured, and found to girth 16 feet 2 inches at 5 feet up.

The Aviary.

A little farther on a short visit was paid to the Royal Aviary. It is a simple Gothic-like structure, in which are kept all manner of domestic fowls, and many other useful and beautiful winged creatures; and ample provision has been made for their care and comfort in a state of captivity.

The Dairy.

The inspection of the Royal Dairy, which was the next item in the day's programme, was a matter of great interest, particularly to those of the party directly connected with farming and the production of milk and butter of the finest quality. A more elegant dairy, in the Renaissance style, or one better adapted for all the purposes for which dairies are designed, does not, it is safe to say, exist. It is a model worthy in itself of going many miles to see. Built under the direction of the late Prince Consort, the dairy was erected in the twenty-first year of Her Majesty's reign. The milk-room, which is 36 feet long by 20 feet in breadth, has a most pleasing aspect, with its open timber roof, and its walls beautifully lined with glazed ornamental tiles of tasteful designs. The frieze consists of Majolica bas-reliefs illustrative of agriculture, and at intervals are introduced medallions of the Royal Family. There are ornamental Majolica fountains at each end of the room, and on the south side, worked in white marble, stands a nymph pouring water from a jar into a marble basin. The tables,

on which the milk dishes are placed, are of white marble supported on coloured marble pedestals. Underneath the tables are open channels laid with white enamel tiles, over which a stream of pure cool water is constantly flowing. The windows are of stained glass, with beautiful designs of spring flowers; the floor is laid with ornamental tiles of an attractive pattern; and everything about this charming building was elegant, clean, cool, and sweet, the beau ideal of a dairy.

The Gardens.

Matters arboricultural and horticultural were now reverted to, the party being again under the able guidance of Mr Thomas. A short avenue of Wellingtonias was first visited, which was planted by the Prince Consort about thirty-five years ago. The most of the trees have thriven tolerably well, and the finest of them have now reached a height of about 50 feet. A little farther on the company walked down the "Jubilee Avenue," running from the Royal Gardens at Frogmore to the river Thames, a distance of about 300 yards. It is composed of evergreen oaks, *Quercus Ilex*, which thrive so well here, planted alternately with double-flowered cherry trees, but these probably will be removed as the oaks grow and occupy the space. The oaks were all planted on the 20th of June 1887—the Jubilee of Her Majesty's reign—by Royal hands. The first pair, right and left of the Avenue, were planted by the Queen; the next pair by the Prince and Princess of Wales; and farther on each pair of trees were planted by the Empress of Germany and other members of the Royal Family. The oaks are thriving well, and in course of time promise to form beautiful specimens. The Avenue—near by which two fine old Cedars of Lebanon stand sentinel—is an interesting arboreal souvenir of one of the most memorable events in the history of the reign of Her Most Gracious Majesty the Queen.

The company now passed into the Royal Gardens by the main entrance, a handsome gateway beautifully draped with climbers, and the next hour or so was devoted to their inspection and the numerous conservatories, forcing-houses, and other horticultural structures which they contain. There are 31 acres of ground within the walls of the garden and 20 acres outside, in all a total of 51 acres, chiefly devoted to the cultivation of fruit and vegetables for the Royal establishment. The walls are about

12 feet high and of great extent, covered throughout with the choicest varieties of fruit trees, all in fine bearing condition. The main ranges of vineries and peach-houses extend along the north side, about 1000 feet in length, and a vast number of other houses are provided for the culture of pine-apples, melons, figs, cucumbers, tomatos, as well as for the growth of plants and flowers of every kind requiring the protection of glass to bring them to perfection. The soil is generally a good loam, varying to clay, and under skilful culture it was seen to be producing the choicest flowers and fruits of the earth in the greatest abundance. The season, if dry, had been on the whole highly favourable to the production of fruit, and every tree in the garden seemed to be heavily laden with splendid crops, in particular the crops of stone fruit—peaches, apricots, plums, and cherries—were something marvellous, and apples were little, if any, behind them.

A peep into one of the fruit-rooms in passing afforded convincing proof on this point. The enormous quantity, and the high quality of the peaches stored therein, ready for use, was an unprecedented sight even to the most experienced of the company. On an average from 9000 to 10,000 of peaches and nectarines together are gathered annually, and their number in such a season as this may be easier imagined than described.

The Royal Gardens were found, it is needless to say, furnished with every appliance and convenience that horticultural art and skill have devised, and the inspection of them occupied every minute of the time available. Plants, flowers, fruits, and vegetables for the supply of the Royal table and household, are cultivated in immense quantities with great success, and a run through the extensive ranges of glass-houses full of plants and flowers of the best description for every useful purpose, and others full of grapes, pine-apples—extra large and handsome, particularly the Smooth Cayenne—peaches, figs, melons, and the like "richest fruits of the earth," was a great treat to those with a taste for horticulture.

It is nearly impossible—even if it were needful here—to give to those unacquainted with the subject, a fair idea of the comprehensive manner in which horticulture is so skilfully conducted in the Royal Gardens,—but in the fruit department alone it was stated that about 400 pine-apples are produced annually; about 900 melons; grapes by the 1000 lbs.; peaches and nectarines, chiefly from about a dozen select varieties, 9000 to 10,000; apples

and pears by the ton; and all other fruits in like proportion, showing the extensive scale of the demands to be supplied.

Much admiration was expressed at the high state of order and good keeping in which the gardens were seen; and also at the pretty creeper-clad houses and lodges, all in the Elizabethan style, provided for those employed in the Royal Gardens—Mr Thomas's own house, wreathed in roses, clematis, and other beautiful climbers, being specially admired.

The Shaw Farm.

At a short distance from the Royal Gardens is situated the Prince Consort's Shaw Farm, which is the Royal "Home Farm" *par excellence*, and where there was seen a perfectly arranged and most handsome set of farm buildings, complete with every modern contrivance that skill and ingenuity can suggest. The most improved types of machinery, and all other economical appliances of the best description are employed in the working and management of the farm, the chief object here being the breeding and rearing of stock for the production of the finest quality of meat, and of dairy produce. Nor are the people who are employed on the Royal farms by any means overlooked. Neat and commodious residences are amply provided for all, bearing a look of comfort and pleasant home life.

The Prince Consort was one of those rare many-sided men, with clear heads, who could take a thoroughly practical interest in many diversified branches of business, of science, and of art. In addition to his other accomplishments, the Prince was a noted agriculturist, and the Shaw and Flemish Farms at Windsor are practical monuments to his enlightened knowledge and enterprise as a British farmer.

The Shaw Farm—called by the way after a former owner, a Frenchman named Shawe, from whom it was purchased about two hundred years ago—is some 720 acres in extent, exclusive of the Home Park of about 500 acres, which is also under the same management. The Flemish Farm extends to about 400 acres, lying on higher ground fully 2 miles off on the western edge of the Great Park. Her Majesty's Commissioners of Woods and Forests are the landlords of the Royal farms, for which the Queen, as a tenant-farmer, pays rent to the Commissioners. The Prince first became tenant of the Shaw Farm in 1849, and immediately began those improvements of the land which

speedily transformed what was a comparatively sterile soil into one of great fertility and a perfect state of cultivation; but the process by which this was effected has been so often described that it is not necessary to repeat the details. A new steading and other buildings for the farm were erected by the tenant at a cost of some £6000; and, as already said, they are models of their kind. Within the buildings, and in the adjacent parks, were seen admirable stocks of dairy cows, and other cattle of all ages for fattening purposes, sheep and pigs, all of which evoked the heartiest commendations from the agriculturists. In regard to the numbers of the stock, it was stated that of cattle alone there were upwards of two hundred head of different kinds on the farm —both Jerseys and shorthorns being kept for dairy purposes; a herd of 80 of the small white Berkshire pigs, and between 350 and 400 sheep. Both steam and horse ploughs are used in the cultivation of the farm, which, along with the Flemish Farm, is under the sole charge of Mr William Tait, the Queen's Farm-Manager, who in 1882 succeeded his father, who had held the same position from the year 1858. At the inspection of the Home Farm, Mr Tait courteously acted as cicerone to the visitors, and was most active in showing them everything of interest, as well as ready to give explanations upon every point of inquiry.

Mr Tait's handsome and commodious residence stands close to the homestead, and contains a suite of rooms for the use of the Queen when she visits the Royal Farm to inspect the prize stock and other matters in which Her Majesty takes great interest. Everything that was seen about the farm exhibited the great intelligence and skill with which it is so successfully managed.

The Luncheon.

At the conclusion of the inspection of the Shaw Farm, the company were hospitably entertained to luncheon, by the instructions of Her Majesty, in a large and handsome marquee specially erected for the occasion in a field near to the manager's house. The interior of the tent was tastefully decorated with appropriate flags, banners, and gay draperies; and the tables were beautifully dressed with roses and other flowers, among which the Scottish emblems— the thistle, heather, and Scots fir—were ingeniously wrought, in compliment to the visitors, a feature warmly appreciated by them.

Mr Frederick Simmonds, the Deputy-Surveyor of Windsor Great Park and Forest, presided; and the following was the *Menu* on the occasion :—

Salmon Mayonnaise.

Roast Chicken.	Roast Duck.
York Ham.	Glazed Tongue.

Raised Pigeon Pie.

Roast Beef.	Boiled Beef.

Veal and Ham Pie.

Roast Lamb.	Pressed Beef.
Tomato Salad.	Italian Salad.
Wine Jelly.	Fruit Jelly.
Vanilla Cream.	Strawberry Cream.
Tartlets.	Cheesecakes.

Fruit.

For liquors there was abundance of sound English ale, claret and other wines, and "guid Scots drink"; and after so many hours' hard exercise in the open air, it need not be said that every justice was done to this right Royal luncheon.

The Chairman said the first toast he had the honour to propose was that of Her Most Gracious Majesty the Queen. This toast was always enthusiastically received by Her Majesty's subjects all the world over; but he thought he might say on this occasion, after they had partaken of Her Majesty's hospitality under the very shadow of Windsor Castle, it would perhaps be even more heartily responded to than it was on ordinary occasions—The Queen! the company afterwards singing with heart and voice the National Anthem.

The Chairman said the next toast was the Prince and Princess of Wales and the other Members of the Royal Family. They were very proud of their Royal Family. They were foremost in every good work. Those who lived at Windsor saw more of the Royal Princes and Princesses than other people did, and could all the more appreciate their worth. As they were all aware, Prince Christian was Ranger of Windsor Great Park. Many thought that merely an honorary office; but in reality it was not so. The Prince took a deep interest in the Great Park, and he could assure them the Prince thoroughly understood his work. The Princess Christian, as they all knew, assisted in every good work. Her Royal Highness interested herself in charities, not only in the neighbourhood, but all over the country. He could not on this occasion avoid alluding to the public event which took place a few days ago, in which the whole realm was interested—he meant the marriage of the Duke of York to Her Royal Highness

Princess May. Long may the young couple live and have a very successful career!

Mr John Methven, a Vice-President of the Society, said it fell to him, in the regretable and unavoidable absence of the President, Professor Bayley Balfour, to ask them to join with him in offering to Her Majesty the Queen their respectful and heartfelt thanks for the gracious permission Her Majesty had accorded to them to visit the Royal Domain of Windsor, and for the generous hospitality which had been shown to them that day. The Royal Scottish Arboricultural Society had received many marks of Royal favour. Her Majesty was the gracious Patroness of the Society—an honour done to them which was highly appreciated. Many of them looked back with great pleasure to the visit which was paid seven years ago—in the Jubilee year of Her Majesty's reign—to the Highland home of the Queen on the banks of the Dee. To-day was another red-letter epoch in the history of the Society. They had been granted permission to visit the ancestral home of the kings and queens of England—by the gracious will of the Royal Lady who now occupied the throne, and who would always be regarded as the greatest and best of the sovereigns who had ever wielded the sceptre in this country. He thought from this spot, where the Society and the members had been so honoured, they should send to Her Majesty a telegram embodying the sentiment which was in all their hearts, and to which he had so feebly given expression. He was sure they would all agree that a telegram should be sent to Her Majesty at Osborne, saying that they were spending on the Royal Domain a most pleasant day amid objects of the deepest interest to them, and thanking Her Majesty for her gracious and bountiful hospitality.

The proposition of the Vice-President met with a most hearty response, and Mr W. J. Moffat, the Secretary, dispatched the following telegram to Sir Henry Ponsonby:—

"The Royal Scottish Arboricultural Society desire to ask you to convey to Her Majesty their humble and grateful thanks for Her Majesty's gracious kindness in allowing them to visit the Castle and Royal Domain at Windsor, and for the bountiful hospitality they have enjoyed."

A short interval was allowed for the members to enjoy a cigar in the open air before starting to carry out the extensive programme for the afternoon—the exploration of the Great Park and Forest of Windsor.

The Great Park and Forest.

By the kindness of Mr Simmonds there was put into the hands of each member at this stage a neat little pamphlet of a dozen pages, written by himself, in which were detailed with much clearness and conciseness the route to be followed, and the places of interest to be visited, during the drive through the Great Park and Forest in the afternoon. All the information it contained will be embodied, in one form or another, in this report in the course of the details of the drive; and it need scarcely be added that the numerous company in the long stretched-out cortege, found in it an invaluable aid to their journey through the Great Park and Forest.

Twelve large brakes from Windsor town were required to accommodate the company, numbering about 160, and all were ready to start at 2 o'clock, under the guidance of Mr Simmonds, to whom the party were deeply indebted for the tact and skill with which he successfully carried out the heavy programme of the afternoon. To facilitate the progress of the party, he had thoughtfully drawn up the following arrangement of the route and distances to be traversed, a copy of which was furnished to the members in each conveyance :—

From Shaw Farm to Flemish Farm, *viâ* Sheet Street,	$2\frac{1}{4}$	miles.
,, Flemish Farm to Cranbourne Tower,	2	,,
,, Cranbourne Tower to Queen Adelaide's Beech,	1	,,
,, Queen Adelaide's Beech to Prince Consort's Workshops,	2	,,
,, Prince Consort's Workshops to Cumberland Vinery,	1	,,
,, Vinery to Tent Ground Gate,	2	,,
,, Tent Ground Gate to Iron Gates,	$1\frac{1}{4}$	,,
,, Iron Gates to Ruins,	1	,,
,, Ruins to Belvidere,	$\frac{1}{2}$	,,
,, Belvidere to Blacknest,	$\frac{3}{4}$	,,
,, Blacknest to Iron Gates,	2	,,
,, Iron Gates to Rhododendron Ride Gate,	$1\frac{3}{4}$	,,
,, Rhododendron Ride Gate to Snow Hill and Long Walk,	$\frac{3}{4}$	,,
,, Snow Hill to Windsor, White Hart Hotel,	$2\frac{1}{2}$	,,
	$20\frac{3}{4}$	,,

For rich woodlands, picturesque scenery, and historic associations, few parks anywhere can approach Windsor Great Park. In speaking of the Great Park, it is usual to include that portion of it known as Windsor Forest. The extent of the whole—Great Park, Little Park, and Forest—is not less than 14,000 acres, and of that area over 2000 acres are under oak, the timber everywhere being of the heaviest character. It may give some idea of the

Domain when it is mentioned that there are in it 42½ miles of gravel roads, 68 miles of grass drives, 78 miles of fencing, and several large ponds or lakes, one of which is the well-known Virginia Water covering an area of 150 acres. It would, however, be impossible in the space at our disposal to speak of the splendid arboreal treasures and interesting features which were brought under notice in the course of our drive of 20 miles through the most lovely woodland scenery of this favoured district of England.

"The noonday sun
Now shone upon the forest one vast mass
Of mingling shade,"

and to most of us every foot of the way was new, and therefore deeply interesting.

Driving off from the Shaw Farm sharp on 2 o'clock, we soon cross the Long Walk, a magnificent avenue, along which we will return in the evening, and pass out on to the public road in the suburbs of the town of Windsor. Turning to the left along King's Road, which for some distance bounds the Park, we note that many of the fences around the villa and cottage gardens are formed of split oak pales, which have a neat, rustic appearance, and are said to be almost as durable as iron. The gardens and grounds attached to the villas were prettily furnished with choice trees and shrubs, among which were many nice examples of Conifers and other ornamental species. Near the entrance to Queen Anne's Ride stood a splendid specimen of the weeping willow, *Salix babylonica,* displaying great beauty of form.

Queen Anne's Ride.

Entering the Park again by Queen Anne's Gate at the end of the King's Road, we are in the grand avenue known as Queen Anne's Ride. It stretches from here right across the Park to the boundary near Ascot, a distance of about three miles, and is formed of fine old trees, mostly elms, set in a single row on each side. Between the rows of the trees is a fine grassy expanse of springy turf, over which on a fine day thousands of pedestrians are said to speed on their way to Ascot races, and the gay sight seen on a bright summer's day is not easily forgotten by those who have once witnessed it. In the Great Park on our left, and not far from the entrance to the Ride, is the Royal Review Ground. On it stands a fine oak, known as the Queen's Review Oak, near

which the troops are mustered in full array, and pass before Her Majesty in all the pomp and panoply of war.

The Flemish Farm.

Bearing away to the right, we proceed along the Prince Consort's Drive on our way through the Park to the Flemish Farm. On nearing the Farm we were shown the splendid pedigree herds, drawn up in the parks close to the drive, of Devon and Hereford cattle, which have gained so much fame in the exhibition yards of the Royal and other Agricultural Societies of the country. Their symmetry and distinguishing points were keenly scanned with much interest by the visitors, as these breeds are rare in Scotland, and seldom seen, even at agricultural shows, in such perfection of type as they were here presented. In front of the farm several fine Clydesdale horses were paraded for inspection, and with their points and merits the party were evidently more familiar, and much admired their noble style and action. The great feature of this farm is the commodious homestead, through which the party was led again by Mr Tait. At the time it was erected, at a cost of about £6000, it was considered the most complete set of farm buildings in the country, and formed the model for many of the best homesteads that have since been erected in England. The soil of the farm is naturally of a poor description, and in many places cold and wet; but by a perfect system of drainage, thorough tillage, and skilful management, it has been brought into a high state of cultivation and fertility. About 240 acres are arable, and cropped on the four-course rotation. Beside the pure-bred Hereford and Devon herds of cattle, a superior breed of Berkshire pigs are maintained here.

The Prince Consort's Memorial Oak.

A little after leaving the Flemish Farm, the Prince Consort's Memorial Oak is seen, a vigorous young tree growing on the right, and near the road. The inscription on the tablet fully explains the event it commemorates, namely—"This tree was planted by Her Most Gracious Majesty Queen Victoria, on the 25th November 1862, to mark the spot where her much-loved Husband, His Royal Highness the Prince Consort, finished his last day's shooting, November 23rd, 1861." The tree is a scarlet oak, *Quercus coccinea,* and is in a healthy and thriving condition.

The Maiden Oaks Plantation.

Proceeding, we are shown the Maiden Oaks Plantation near the park-bailiff's lodge, which we are told is the oldest authenticated plantation of trees in England. It covers about 13 acres, and was planted in 1580. In a lecture delivered a few years ago, by Mr William Menzies, son of the late Mr William Menzies, Deputy-Surveyor of Windsor Forest and Parks, the origin of this historic plantation is thus put on record :—

"The anxiety of Queen Elizabeth as regards timber has been attributed to the dread of the Spanish Armada, and to the idea that the destruction of the Forest of Dean was part of the mission of that fleet. When the Spanish Armada was wrecked, in one of the ships stranded on the coast of Devon, was found a paper of instructions to the Admiral, telling him above all things to cut down and destroy the Forest of Dean, so that the navy of England might be effectually crippled. This paper fell into Lord Burleigh's hands, and alarmed him and the whole nation. Among the projects submitted to him for providing timber for the navy in some inland locality which could not be so easily reached by an enemy as Dean Forest, was a scheme to form an enclosure or plantation in Cranbourne Chase, and to sow it with acorns as an experiment. Lord Burleigh stretched his powers so far as to get this done. . . . The plantation here referred to is the large area of Maiden Oaks, stretching from the back of the park-bailiff's house and premises in the direction of Cranbourne, and the corner tree of the wood, which was sown in 1580, is the true progenitor both of the modern Royal woodlands of England, and also the system of rearing oaks where they had never previously existed."

The facts stated are inscribed on a metal pillar, standing at the foot of the "progenitor" tree; a capital method in vogue at Windsor of indicating the events and incidents connected with trees and plantations, which with advantage might be more generally adopted. Painted white, the pillars are easily found in the thickest plantations, and for durability they cannot be excelled. A dash was made into the plantation by a few of the enthusiasts of the party, who, after scrambling through the rich undergrowth of tall fern and tangled brushwood, reached what appeared to be the largest tree in the wood. The tape was applied, and its fine stem was found to girth 15 feet 7 inches at 5 feet up. The average of the oaks had straight clean stems, with a girth of between 8 and 9 feet, at the usual height of measurement, 5 feet from the ground, which is always understood when no height is stated. On our way to Cranbourne Chase, some grand old specimens of pollarded oaks were seen in the park, in which herds of fallow deer were quietly browsing on the barest and brownest of pasture.

Cranbourne Tower.

Cranbourne Tower, now shorn of much of its former magnificence, is an edifice of considerable historic interest. Built in the reign of Charles II. by the Earl of Ranelagh, it was afterwards occupied by the Duke of Cumberland, and latterly by the Princess Charlotte of Saxe-Coburg. Much of the building has been pulled down, but the fine Tower remains, and is occupied as a lodge by one of the park-keepers. From the elevated site on which the Tower stands, beautiful views of Windsor Castle and the surrounding country were obtained. Here, it may also be stated, are situated the large reservoirs, to which water is pumped from the Thames, for the supply of the Castle. At a short distance from the Tower, a pillar tablet is placed with the following interesting inscription:—"The celebrated Race Horse 'Eclipse,' by Marske out of Spiletta, was foaled in this Paddock, 1764. He was bred by H.R.H. William, Duke of Cumberland."

William the Conqueror's Oak.

The party had a capital view of a fine herd of the rare "White Hart" deer in the course of their walk across the Park to the spot where stands the venerable "Monarch" Oak of the Forest, beneath whose boughs the hart may have browsed, as it does to-day, before the advent of the Conqueror. This Veteran of the Forest—known as William the Conqueror's Oak—grows in the White Hart paddock on its western side, at about five minutes' walk from Cranbourne Tower. It is a very fine specimen of an old oak. It has been known as William the Conqueror's oak for many generations, though no record is obtainable giving the reason why it should have been so named. There is no doubt it may have stood in the Conqueror's time; and the grand look-out over the neighbouring country from this high-lying spot might have brought Norman William often under its boughs to watch and rest. This noble tree is now a comparative wreck of its former stately grandeur. The gigantic bole is quite hollow with decay in the centre, and the massive limbs that tower aloft are many of them lifeless. Still a considerable portion of the tree is alive, and pushes forth shoots and green leaves annually, which it may continue to do for ages to come, if left unmolested by nature and man. An interestingly curious feature of this grand oak is, that after the bole had split and decayed, the bark

had turned and wound itself, in the course of its annual growth, round the half of the tree; and it is on this side, which is well shown in the illustration, that the great limbs are still growing most freely, and adding to their substance yearly. These huge overhanging limbs are carefully supported by substantial posts, and every means appear to be adopted to preserve this grand Monarch of the Forest to future generations.

WILLIAM THE CONQUEROR'S OAK.

In applying the measuring tape to the stem, it was found there were so many inequalities along the sides of this mighty tree that it was somewhat difficult to get a measurement which would fairly represent the circumference of the bole; but after much care the tape was adjusted, and the resulting girth was 36 feet at as near 5 feet up as could be determined. In Mr Simmonds' book, through a printer's error, the circumference given is only 27 feet, which it was explained should have been a girth of 37 feet. The company, however, agreed that the 36 feet girth

was a fair representative measurement. To test the capacity of the hollow chamber in the centre of the trunk, a number of the members crowded into it until it was tightly filled, and as they came out it was found that eight-and-twenty full-grown men had been able to find standing room in the hollow of the enormous bole.

The age of this oak is estimated at one thousand years.

> Time gave it seasons and Time gave it years;
> Ages bestowed and centuries grudged not:
> Time knew the sapling when gay summer's breath
> Shook to the roots the infant oak, which after
> Tempests moved not. Time hollow'd in its trunk
> A tomb for centuries: and buried there
> The epoch of the rise and fall of states,
> The fading generations of the world,
> The memory of men.

Windsor Forest.

Driving onwards through the Forest, we next visited Queen Adelaide's Beech, which evidently was selected and named for the splendid view obtained from the spot, by Queen Adelaide, the consort of William IV. It is a tall handsome tree, with a clean bole girthing 17 feet. In this part of the Forest, outside the Ascot gate, are three other Royal trees, all oaks, called respectively Queen Anne's, Queen Charlotte's, and Queen Victoria's. The two first have a girth of 17 feet; and the latter, which is a very handsome tree, with a straight clean stem 36 feet in height before it throws out a branch, has a girth of 12 feet. In the same neighbourhood, which the time would not permit the party to thoroughly explore for fine trees, there are some grand old pollarded oaks, supposed to be from eight hundred to one thousand years old, and still in a good state of preservation.

In Cranbourne Chase, at some distance off, it may be also put on record, there is an oak said to be the largest in Windsor Forest. Mr Simmonds' book gives the girth of it as being 35 feet, while the Oxley's *Windsor Guide* says 40 feet; but like the Conqueror's Oak, the bole is very irregular and knotty, and the difference in the measurements is therefore easily accounted for.

Retracing our route till we again enter the Park at Forest Gate, we strike off eastward through some fine woods of the present century, with here and there an ancient remnant of the earlier forest standing among them. Anon we reach the breezy

uplands of the open park, and bowl along a well-made drive, admiring the splendid views obtained from it of the Castle and a wide extent of country stretching far beyond Windsor. Our attention is directed as we pass to the Queen's Jubilee Oak, standing a few yards off on the left of the drive. It was planted by the Princess Christian, on the 30th December 1887, in commemoration of the Fiftieth Year of Her Majesty's reign.

The Workshops.

A little farther on the party had the great privilege of making an inspection of the Prince Consort's Workshops, in which all the estate work is executed. They were found to be admirably equipped, and commanded general admiration. The steam sawing machinery consists of a 14 horse-power steam-engine, a travelling saw-bench for heavy timber, a bench for moulding smaller scantlings, a special bench for cutting foreign hard-wood timber, a saw sharpener, and a variety of other machines of a useful description. In case of need a turbine wheel, worked by water-power from a pond close by, can be used. All the machines in the sawmill and workshops being at work, they were examined with great interest by the company, and the quality of the work they were turning out was entirely satisfactory. A clever contrivance for hauling the raw logs from the yard into the sawmill, and placing them in position on the saw bench by mechanical power, worked by the sawing machinery, was much admired. The engine, and all the shafts, belts, and pinions for working the saws, are placed in a chamber below the floor, so that the greatest safety from accident is obtained. The refuse wood and sawdust are almost the sole fuel used for the engine, coal being a costly item in this southern part of England.

The buildings comprise an excellent suite of offices, which include a clerk of works' office, a benched carpenter's shop, a blacksmith's shop, fire-engine house, two wheelwright's shops, mess-room, stabling for twenty horses, storerooms for seasoning timber, etc. There are commodious residences for the foreman of the Park and the foreman of wheelwrights, and nice cottages for three of the carters. From this busy little hive of forest industry, all the buildings in the park and forest, the gates, fences, roads, rides, deer pens, cattle sheds, and other erections, are kept in repair by the staff of workmen regularly employed on

the estate. The men are generally born, and live, and die, in the Park, a service of fifty to sixty years in the employment of the Crown being not uncommon among them.

Cumberland Lodge.

Still going forward on our journey, the carriages next halt near Cumberland Lodge, to allow the party to visit the large vinery in the garden at the foot of the wooded slope on which the Lodge stands. In it grows the "Royal Vine," and from the fame it has attained, its large size, and the heavy crop of beautiful grapes it was bearing, it was the unanimous opinion that it well deserved the title. It is the old Black Hamburgh variety, about one hundred years of age, and no less than 1200 lbs. of luscious black grapes were gathered from it last year. They are all sent for the use of Her Majesty wherever resident. The vinery, which the vine completely fills, is 138 feet in length by 20 feet in breadth; and in size it surpasses the famous vine at Hampton Court. The tape was passed round the main stem of the vine, at a foot from the ground, and the girth was found to be 41½ inches. The vine is still growing with great vigour, under the fostering care of Mr Owen Thomas, who includes this wonderful product of nature in his extensive charge, and an experienced vine-grower is specially employed in attending to its wants.

The Ranger of Windsor Great Park, Prince Christian, occupies Cumberland Lodge. It stands on a fine site amid ornamental plantations, shrubberies, and lawns, and a good view is obtained from it of the Queen's Schools and Big Meadow Lake in the richly-wooded valley to the southward. Some vigorous growing Conifers were noticed in returning from the Vinery, and most of the tribe seem to thrive remarkably well in this locality. Near the Lodge are also the Royal stables for the Queen's hunters, which are ridden by the master, huntsman, and whips of Her Majesty's stag-hounds. Hunters belonging to other members of the Royal Family are also kept here.

The Schools.

Again mounting the carriages, the Royal Schools were the next object to attract our attention. They were founded in 1845, and are entirely supported by Her Majesty, for the education of the children on the Crown estate, including those of the Castle and the farms. About 120 boys and girls not only receive a good

education here, but Her Majesty generously provides them with a neat suit of clothing—Scots plaid for the boys, and a tartan dress, with a red cloak, and straw hat with blue ribbons, for the girls—and a substantial dinner daily. In addition to a good English education, the boys are taught farming and gardening, and the girls sewing and the management of domestic affairs; thus qualifying them, as far as possible in early life, for the due performance of their duties in the world.

The Prince Consort's Jubilee Statue.

We now find ourselves emerging on Smith's Lawn, an open plateau of considerable extent, on which has lately been erected the magnificent equestrian statue of the late Prince Consort, the Jubilee gift of the women of Her Majesty's Empire. The new carriage approach to the statue being yet quite impassable for the heavily-loaded carriages, we drove straight on, but had a fine view *en passant* of the beautifully modelled statue, the grand outlines of which elicited general admiration. The tablet on the base of the statue bears the following inscription :—

ALBERT,
PRINCE CONSORT,
Born Aug. 26, 1819. Died Dec. 14, 1861.
This Statue was presented to
VICTORIA,
QUEEN AND EMPRESS.
A token of love and loyalty from the Daughters
of Her Empire,
In remembrance of Her Jubilee,
June 21, 1887,
And was unveiled here on Monday, May 12, 1890.

Continuing the drive through park and forest scenery of the most enchanting character, the beauty, size, and variety of the trees, with the lights and shadows playing upon them, was a most pleasant sight to behold, and with the poet Spenser in the *Faerie Queen* we praise

"The trees so strait and hy,
The sayling pine, the cedar proud and tall,
The vine-propp elme, the poplar never dry,
The builder oake, sole king of forests all,
The aspine good for staves, the cypresse funerael."

We pass, in the cool valley leading to the lake, through beautiful groves of yew and cedar, and under tall Spanish chestnut,

larch, Scots fir, and many other trees, all growing in great luxuriance. Our attention is directed also to stately representatives of some of the newer Conifers in an equally thriving condition; and we are especially delighted with a fine grove of graceful birches, 60 feet or more in height, with their silvery bark glistening brightly in the sunshine.

Virginia Water.

The delightful expanse of Virginia Water now bursts upon our view, and driving along its edge, we vote the guide-book description not at all an exaggeration, where it says that it "is a charming artificial lake, situated in the midst of all that is most beautiful in English scenery." The water sparkling in the sunshine is completely surrounded by densely-wooded heights, rising one above the other in agreeable perspective, so that the outer world is totally excluded from the view, while at the water-edge lies a rich verdant carpet of grass, which supplies, as it were, the "mount" to this exquisite sylvan picture. Not a sound is heard save the singing of the birds, and the muffled roll of the wheels of our carriages over the springy turf. All is peaceful and serene. The grounds, it seems, were planted and the lake formed out of a large swamp about the year 1790.

It is supposed that the name "Virginia Water" was given to the lake by the Duke of Cumberland and Paul Sandby, the painter, who constructed the lake, on the idea that it represented, on a small scale, the extensive forest scenery of the great State of Virginia in America. George IV. used to spend a great deal of his time here in the summer months. It is to him, in conjunction with Sir Jeffrey Wyatville, the architect, that we are indebted for the construction of the Pagoda, which curious erection is seen rising on the other side of the lake, and is now known as the Fishing Temple; and for the ruined classic temple which stands in a secluded spot near the Cascade at the south-eastern end of the lake.

The Cascade.

Skirting the shores of this beautiful sheet of water for more than a mile, we arrived at the Cascade and the Robber's Cave, where the party dismounted to have a closer view of them. The

Cascade is artificially formed at the outlet of the lake, and is constructed in a natural and picturesque manner. The huge rocks and boulders are so arranged as to hide all appearance of being "built," and with the waters rushing over them the effect is always

CASCADE AT VIRGINIA WATER.

very pleasing, but especially after heavy rains, when the volume of water is greatly increased. Flowing past the Robber's Cave—constructed by the side of the Cascade in the shape of a very natural-looking cavern — the stream disappears among the umbrageous banks of a lovely glen.

The Ruins.

Walking along the margin of the lake for about a quarter of a mile, the site of the "Ruins" is reached, picturesquely occupying the gorge of a small valley running back from the lake. A fine open grassy glade, in a beautiful setting of trees, leads up from the lake to the Ruins, on approaching which the effect of the ruined temples, broken columns, dilapidated pedestals, and fallen statuary, amid the wealth of vegetable life in which they appear, give a weird reality to the scene. The Ruins, of course, are not the decaying remains of ancient civilisation and architectural art on the spot they now occupy; but the materials of which they consist have a great interest attached to them, seeing that the greater portion of the grey granite and porphyry columns and marble statuary are of Greek and Roman origin, and are supposed to be about two thousand years old. They were brought from Tripoli and deposited in the British Museum in 1817, from whence they were removed by command of George IV. in 1827, when they were placed in their present position by Sir Jeffrey Wyatville.

The Cedar Drive.

Passing under the dilapidated arch which forms the centre of the ruins, we arrive at a splendid grove of yews, many of them being of great age and size. Walking along the Cedar Drive, some grand specimens of Cedars of Lebanon are observed, with tall clean stems of great girth. One, which was estimated to be 110 feet high, was measured and found to be 12 feet in girth. Another was 14 feet 8 inches in circumference of stem, and a third 15 feet 10 inches. A large number appeared to be very near these fine dimensions. The Scots firs in this locality also commanded attention, from their large size and straight clean boles. One selected at random was measured and found to be 10 feet 4 inches in girth, with a fine cylindrical stem, and a total height of over 90 feet.

Belvidere Fort.

Ascending an eminence called Shrub Hill, we reach Belvidere Fort, placed on its summit and overlooking Virginia Water. It is a curiously-shaped building—more like a gigantic toy-house than an impregnable Fort—with battlements around it, on which are mounted twenty-one brass cannon, which are now used solely

for firing Royal salutes. The Fort is almost hidden from sight, until we are close upon it, by the luxuriant vegetation which has sprung up in course of years. To this retired spot Her Majesty occasionally resorts when at Windsor, and partakes of tea in the Queen's Tea-Room, set apart in the Fort for the purpose. On the greensward of the lawn, beside a six-gun battery, the company were served to a most refreshing tea; and, after the long drive over dry, dusty roads and through the close-heated woods, without a breath to cool the air, never was beverage more grateful to thirsty travellers.

Just beyond the low embrasured parapet wall of the battery there was a genuine bit of wild woodland, with an undergrowth of heath and bracken—thoroughly Scottish in character—where, in a small open space on its edge, the Council of the Society planted, in due form, a nice healthy young specimen of Prince Albert's Fir, *Abies Albertiana*, which had been presented to the Society for the occasion by Mr Alexander Milne, of James Dickson & Sons, Nurserymen, Edinburgh, who had carefully brought it all the way with him to be here planted. Long may it thrive and flourish! in commemoration of the Society's visit to the Royal Domain.

Belvidere Fort to Windsor.

At the conclusion of the ceremony, the order was passed round to mount the carriages for the return journey to Windsor. Retracing our steps along the beautiful drive and following the margin of the lake as far as Blacknest, it was there forded near the outlet, in clear shallow water, the cooling effects of which the horses seemed to enjoy; thus saving a stiff hill and a considerable detour. After a lovely drive along the eastern shore of Virginia Water, with the rays of the declining sun brilliantly tinting the glorious landscape, the route onwards lay through a part of the ancient Forest, the scene of Pope's "Windsor Forest." His brilliant description of the dying pheasant—

> "See! from the brake the whirring pheasant springs,
> And mounts exulting on triumphant wings:
> Short is his joy; he feels the fiery wound,
> Flutters in blood, and panting beats the ground,"

which is said to have been inspired by the Forest scenes, is nearly as familiar as the oft-quoted lines in his "Essay on Man"—

> "Hope springs eternal in the human breast:
> Man never is, but always to be blest."

VIEW IN THE GREAT PARK.

The chief features of interest on the route through the Forest and Great Park on the way to Windsor, are the beautiful views of the landscape, of which the opposite illustration gives a good idea; the splendid Avenue, Park, and Plantation Trees, the fine examples of choice Conifers, and the wide-spreading shrubberies in which the rhododendron is seen in great luxuriance.

Like many of the woods through which we had passed during the day, those whose recesses we were now threading are well stocked with a splendid crop of timber, chiefly oaks with tall "gun-barrel" stems of great girth, with all the signs indicative of first-class timber. The immense quantity of fine well-grown timber trees on the Royal estate, and the excellence of the management of the woodlands, were a general theme of remark and admiration. It is seldom that so much fine timber is seen on any estate in such good condition and nearing its maturity. Here, it was quite evident that skilful choice has been made in retaining the best trees to form the final crop, producing the high-class timber with which the Royal woods abound.

Many fine specimens of the best kinds of Conifers are noted as we wind along through the woodlands. They are generally in a vigorous condition, and promise to become worthy fellows to the giant hardwoods in the course of another generation or two. In a wide open space, lying to the left of our route through the forest, the Cumberland Obelisk is seen, around which ivy clings more than half-way up the massive column.

The Rhododendron Ride.

By-and-by we enter the famed Rhododendron Ride, adorned with immense spreading banks of these beautiful flowering shrubs, towering high above our heads on the top of the coaches, and when they are in their glory of bloom, in early summer, they must present a grand display, worth a long journey to view. The Ride extends for about a mile, with the massive banks of rhododendrons rising on either side. It was noticed that on every open spot, even on the hard surface of the roadway clear of the traffic, seedling rhododendrons were springing up literally in millions, and threatening to overrun the whole ground, showing how well adapted the situation is for the growth of that useful shrub. Some of the tallest, straight, well-grown oaks in the forest, are seen among and beyond the rhododendrons, and the whole neighbourhood of the Ride is full of the finest timber.

The Great Park.

Debouching from the Rhododendron Ride, we are again in the open Great Park, and sweeping round the shoulder of Snow Hill, with a splendid panorama expanding to our view on the right, we at length reach the top of the Long Walk, from whence the views are simply magnificent, and must be seen to be realised. On the summit of the hill, on our left, is seen the gigantic equestrian statue in bronze of George III., by Westmacott, standing on a grotesque pedestal, designed, it is said, by Wyatville. It is supposed to represent a gigantic block of unhewn granite. The height of the horse and figure from the top of the pedestal is 25 feet 6 inches; and standing in such a conspicuous position, the statue is seen from a far distance across the country.

The Long Walk.

We are now in the Long Walk, the "Grand Avenue" *par excellence* at Windsor. It runs as straight as an arrow from here to Windsor Castle, now in view right a-head of us at a distance of nearly 3 miles through an unrivalled vista. The road is as firm and smooth as if it was concrete, and the drive down it presented a scene of impressive grandeur. The trees in this magnificent avenue were planted by Charles II., in 1680. There are two rows of elms on each side; the trees in the double rows being set 30 feet apart each way, and the width between the inner rows, across the avenue, is 150 feet. The avenue was completed by William III., but the carriage drive along the centre was not formed till the reign of Queen Anne. The total number of elm trees employed in forming the avenue was 1652; and on the lower part of the ground many of the original trees are now grand specimens of their kind.

In 1859 (according to Mr Simmonds' pamphlet) a commission, of which the Duke of Bedford was president, inspected the Long Walk, and recommended, after mature consideration, that the old trees, where dead, dangerous, or decayed, should be gradually replaced by young elms between the Castle and the Double Gates, but that from there to the statue the soil had proved so unsuitable to the growth of elm that there should be a gradual substitution of oak for elm in that part of the avenue. This plan was therefore adopted on a limited scale at first by H.R.H. the

Prince Consort, the Ranger of Windsor Great Park in 1861, who caused a small enclosure to be planted on the east side with oaks in the line of the avenue, surrounded by nurses of larch and other trees, and fenced in against cattle, deer, and rabbits. Since H.R.H. Prince Christian became the Ranger of the Park three other enclosures were formed and planted upon the same principle in 1879, one on either side of Snow Hill, near the statue, and another opposite the plantation formed in 1861. These young plantations are thriving vigorously, and promise to quite fulfil the object in view in course of time. Ages only can produce the finished picture. The drive down this Grand Avenue to Windsor in the fading light of the evening, fitly closed a memorable day's work of the Society.

The Annual Dinner.

The Annual Dinner of the Society was held in the "White Hart" Hotel, immediately after the party returned to Windsor. Mr John Methven, Vice-President, occupied the chair, and Mr John Michie, Her Majesty's Forester at Balmoral, was croupier; Mr David P. Laird presiding over a second section of the party in another dining-room, so great were the numbers that one room could not be found to hold them. The guests included Mr Frederick Simmonds, Mr William Tait, Mr Owen Thomas, Mr Leonard Collmann, Mr Buckland, Mr Savage, Mr Harry J. Veitch, Royal Exotic Nurseries, Chelsea; Mr J. Forbes, Burnham Beeches; and Mr Charles Herrin, Dropmore. The Mayor of Windsor was invited, but was unavoidably absent. The toast of "The Queen," given from the chair, was specially honoured; and the health of the Prince and Princess of Wales and the other members of the Royal Family was most cordially received. The Navy, Army, and Reserve Forces were also pledged; Colonel Bailey, R.E., and Major Macleod, R.H.A., responding for the Army, and Major Macgregor, 6th Volunteer Battalion Royal Scots, for the Reserves. The "Royal Scottish Arboricultural Society" was proposed by Mr Simmonds, who spoke of the pleasure it had given the Royal officials to receive so influential a Society at Windsor. The Chairman suitably replied. Colonel Bailey proposed the toast "The Guides of To-day," which was pledged with "three times three," and was replied to by Mr Simmonds, Mr Tait, and Mr Thomas. Mr James Watt, J.P.,

Carlisle, afterwards gave the toast of "The Land Agents," which was replied to by Mr Turner, Lord Salisbury's agent at Hatfield. Mr Dunn proposed the toast of "The English Arboricultural Society," to which Mr Watt, J.P., Carlisle, and Mr Bernard Cowan, South Shields, replied; and Mr Michie proposed "The New Members," which was replied to by Mr Annand, the youngest member of the Society present. With song and sentiment an enjoyable evening was spent.

THIRD DAY,

Wednesday, 9th August.

CLIVEDEN, DROPMORE, AND BURNHAM BEECHES.

Windsor Town.

A considerable length of a drive through the southern part of the county of Bucks being on the programme to-day, members were early astir to see the town of Windsor; and also Eton Town and College, which lie contiguous, across the Thames. The Royal borough of New Windsor—there is an "Old Windsor," a village about two miles south-east of the town—has grown up through centuries under the fostering wing of the Castle, its first charter being granted by Edward I. in 1276. The chief objects of interest are the Jubilee Statue of Her Majesty the Queen, by Boehm, on Castle Hill; the Albert Institute in Sheet Street, erected in memory of the Prince Consort; the Town Hall, in the High Street; several handsome churches of various denominations; the Post Office, in the High Street; large cavalry and infantry barracks in which the Guards, Horse and Foot, are quartered; and the fine bridge across the Thames connecting the counties of Berks and Bucks, as well as the town of Windsor with Eton and its celebrated College.

Eton.

Eton Town, apart from the College, consists chiefly of the High Street, running straight out from the bridge towards Slough. The College was founded by Henry VI. in 1441, and has always been considered the greatest of the public schools in England. It

has about one thousand students in attendance at the present day; and many of our greatest statesmen, warriors, and other eminent and distinguished men have been numbered among its scholars. It consists of many spacious edifices designed to meet the requirements of such a noble institution. Broadgreen Meadows, in which are many stately trees of great height and girth of stem, are the famous "Playing Fields" of the College, and occupy a beautiful level site between it and the Thames. The poet Gray thus sings of Eton and its environs—

"Ye distant spires, ye antique towers,
That crown the watery glade,
Where grateful science still adores
Her Henry's holy shade;
And ye, that from the stately brow
Of Windsor heights, th' expanse below
Of grove, of lawn, of mead survey:
Whose turf, whose shade, whose flowers among,
Wanders the hoary Thames along
His silvery winding way."

St George's and Albert Memorial Chapels.

The party having explored most of the prominent features of interest in Windsor and Eton, and around them, in the early morning, breakfasted, and were ready to proceed again to the Castle by half-past eight o'clock, to complete the inspection of those portions of the Royal residence which were postponed for want of time to see them on the previous day. The sun again shone out brilliantly as the members mustered on the Castle Hill, and it continued to do so throughout the day with an almost tropical heat. Starting prompt to time, the first visit was made to St George's Chapel—the party having again the benefit of the guidance of Mr Leonard Collmann and a number of the officials at the chapel to give explanations of the many objects of interest in it. The chapel is one of the most beautiful specimens of Gothic architecture in the country, and with its elegant proportions, its beautifully stained windows, the deeply interesting memorials of bygone ages, and the banners and shields of the Knights of the Garter with which the chancel is adorned, the party were lost in admiration. Willingly would they have spent a much longer time amid its stately grandeur and reposeful surroundings. We passed from St George's to the

Albert Memorial Chapel, formerly known as Wolsey's Chapel, which was restored and beautified by the Queen as a memorial to the Prince Consort. In its restoration, and in the decoration of the interior, the leading artists of the day were employed, and it is now one of the richest and most elaborately decorated edifices of modern times. The roof is formed of beautifully enamelled mosaic; the walls are coloured marbles, enriched with classic sculptures; the windows are of gorgeous design; and the marble flooring a perfect work of art. Along the centre of the chapel are the cenotaphs to the Prince Consort, the Duke of Albany, and the Duke of Clarence.

On emerging again into the open air, the party gathered upon the broad flight of stairs under the great western window of St George's Chapel. Here the large group was successfully photographed by Mr Philip Cockburn, Dalkeith, photographer to the Society.

Windsor to Cliveden.

By 10 o'clock all were in readiness to start from the White Hart for Cliveden, a distance of about 8 miles from Windsor. In a dozen well-filled brakes the party crossed the Thames, drove through Eton, and took the road by Dorney and Burnham to Cliveden. The sun was pouring down its rays in all their strength as Eton was left behind, the roads were deep in dust for the first mile or two, and the few trees here and there afforded a grateful shade as we passed them. The fields along the road presented everywhere a deplorable sight, on account of the long-continued drought which had been experienced in this part of England. On the light gravelly and rather poor land of the district, a great deal of the oats and barley appeared to be not worth reaping. On some broad acres which had been cut, it looked as if the whole produce of the soil could be taken to the stackyard on a single cart. Turnips were literally burnt out of the ground, and potatoes were also a very poor crop. Such a state of things the agriculturists of the party declared that they had never before witnessed. *En route*, the company were much attracted by the tumbledown picturesqueness of many of the rustic cottages, thickly clad as most of them were with a wealth of climbers, among which *Wistaria sinensis* was conspicuous; by the splendid elms and tall poplars in the vicinity of Burnham Abbey;

the fine walnut-tree avenue at Huntercombe; the pleasant little town of Burnham through which they drove, and the picturesquely wooded aspect of the country as they neared their destination.

Cliveden.

Arriving at Cliveden, or, as it is sometimes spelt, Cliefden, the company were met by Mr Richard Nisbet, gardener and steward, who acted as guide through the policies, and by Mr Harry J. Veitch, of the well-known Chelsea Nurseries. Cliveden was formerly the residence of George IV. when he was Prince of Wales. It afterwards came into the possession of the Sutherland family, to the second Duke of which house there is a fine monument in the centre of one of the avenues. It subsequently fell into the possession of the Duke of Westminster, who, however, has in turn parted with it to an American gentleman, Mr Astor, into whose hands it passed in September. There is a splendid mansion in the Italian style of architecture, by Barry, the architect of the Houses of Parliament, and the pleasure-grounds, nearly 400 acres in extent, have been charmingly laid out in gardens, shrubberies, and wooded parks, from various parts of which most beautiful views of the Thames can be enjoyed. In driving up the avenue we note some fine specimens of ornamental Conifers, such as *Abies lasiocarpa*, *A. cephalonica*, *A. Douglasii*, *A. nobilis*, *Retinospora squarrosa*, and others of the newer kinds; and the laurels were growing in great profusion along the sides of the drive. One of the chief arboreal features of the place is a fine grove of evergreen oaks called "The Ribbons," which it is known were there in the time of George IV. Near to the grove is a statue of the Prince Consort, in Highland costume—on a rocky pedestal—being a replica of that erected at Balmoral. The whole of the policies are heavily timbered, and the walks are arranged in such a manner as to give the estate, in walking over it, an aspect of much greater extent than it really possesses. This is the country of the beech; and at Cliveden it was found growing in much luxuriance. There were also many fine oaks and Spanish chestnuts met with, and among the lowlier growing subjects that attracted our notice were here and there patches of heather in sweetest bloom. From the high walk along the south-west side of the estate, lovely views of the Thames valley were obtained. Many of the natural pictures seen, with a lovely

reach of the Thames far below us in the foreground and set in a veritable frame of living green, were of the most enchanting character. At one of these commanding spots stands—nearly opposite to a village of the same name on the farther side of the Thames—the "Cookham Oak," an old residenter on the estate, which has a bole with a girth of 15 feet 9 inches at 5 feet up.

From the grand terrace in front of the mansion-house splendid views were obtained over a wide extent of the beautifully wooded upper valley of the Thames, with the pretty town of Maidenhead nestling in its bosom, and many villages and church spires peeping out from amidst sylvan greenery. Right in front, about 10 miles off, lay Royal Ascot, with its famed racecourse, while the towers of Windsor Castle are seen in stately strength a little to the left, clearly outlined against a well-wooded background of the Surrey hills. The flower-garden — laid out in the Italian style — was ablaze with colour in the tastefully arranged parterres, and the whole environments were in harmony with one of England's stateliest homes. Near to the mansion were several fine Cedars of Lebanon and well-grown sycamores, which lent a dignity to the scene; while the face of the terrace walls were wreathed with roses and other choice climbers, among which was specially observed a grand example of the handsome evergreen *Magnolia grandiflora* in full flower, its large, sweet-scented, snow-white blossoms being much admired.

While enjoying their walk upon the terrace, the party were met by the Duke of Westminster, to whom several of the Members of the Council had the honour of being introduced. He warmly welcomed the party to Cliveden, and mentioned the principal features of the place which the visitors should see before leaving. On the motion of Mr Dunn, a cordial vote of thanks was given to his Grace for his kindness in opening his policies to them. The Duke in a word replied that he was very glad to see the Society, and hoped they would all enjoy their visit.

The walk through the policies was continued, down a steep hill slanting towards the Thames, through a solemn-looking avenue of yews, the tops of which met overhead and shut out much of the light of day. Some of the yews at the lower end of the avenue were very fine trees, with heavy boles. The party emerged on the grassy slopes by the banks of the river, where, in the course of the walk along them for some distance, there were seen several giant elms, and three magnificent Lombardy

poplars shooting straight aloft some 120 feet into the air, one of them having a bole measuring 10 feet in girth. There were also two remarkably fine tulip trees, *Liriodendron tulipiferum*, between 90 and 100 feet in height, the largest of which girthed 9 feet 4 inches and the other 8 feet 6 inches. A stiff climb up a steep bank overgrown with old yew trees, brought the party again to the high ground where the carriages were waiting to convey them on their way.

Dropmore.

Dropmore, the seat of Lady Fortescue, was the next place visited. It lies adjacent to Cliveden, and was soon reached. Here the members enjoyed a rare treat in viewing the unique collection of specimen Conifers, among which are some of the largest and finest of their kind in Britain, or in fact in Europe. The members who visited the Perthshire estates with the Excursion last year, and noted the exotic Conifers growing there in their thousands in the greatest vigour, saw at Dropmore many of the same species that have attained to nearly their full size, and as they have been well taken care of from the beginning, their habits and characteristics are displayed to perfection. This charming estate was made what it is by the culture and taste of the late Earl and Countess of Grenville; and it is worth, to the arborist, going a long day's journey to see. The treatment of the enclosed grounds, about 1000 acres in extent, presents a very happy example of the effects of the combination of nature and of art. Much of the land had originally been a common, on which the heather, the bracken, the juniper, and the silvery birch still grow in all their pristine beauty. In certain parts of the grounds one might think they were in the heart of the Highlands, and not in sight of Windsor Castle; but at other parts there are handsome avenues and fine open grassy glades in which are growing firs, pines, and cedars from the Himalayas, Andes, Rocky Mountains, Mexico, Canada, Japan, and other distant countries.

Mr Charles Herrin, gardener and steward, met the party at the west entrance, and in driving along the beautiful winding avenue pointed out a number of memorial and other notable trees—among them, some fine cedars planted on the Queen's Coronation Day in 1837, and *Abies Nordmanniana* planted on the Queen's Jubilee Day in 1887; a couple of silver limes, and the

"Boscobel Oak," which is associated with the name of Lady Grenville. One of the finest attractions, however, to which the party were introduced by Mr Herrin, was an imposing Cedar Avenue, composed of Cedars of Lebanon, which, planted eighty ago years, have now attained to an average height of something like 80 feet and a girth of about 8 feet. There are 170 trees in this fine avenue, planted some 25 feet apart, and although it is about 50 feet across, the heads of the trees on each side of the avenue have mingled, and, shutting out the sun, give to the place a sombre and reposeful aspect. The trees are in vigorous health and growing freely, and the well-developed foliage has a fine glaucous tint, with thousands of cones nestling among it on the upper branches, all the cedars here bearing abundance of cones this season. There are many other splendid cedars on the grounds, in fact, the Cedars—Lebanon, Indian or Deodar, and Mount Atlas—are a leading feature at Dropmore. Of the Cedar of Lebanon there is a grand example standing near the house, which has the credit of being the first coniferous tree set out on the estate. It was planted by Lord Grenville in 1792. It is now 104 feet in height, and at 3 feet up —the height at which the estate officials have measured all the Dropmore trees—it girths 13 feet 7 inches. Near the Cedar Avenue grows a handsome, silvery-foliaged specimen of *Abies nobilis*, which was planted in 1835, and has now a girth of 7 feet 5 inches; but, like many examples of its species, it has unfortunately lost its top by the storms.

The mansion-house at Dropmore is a comfortable-looking plain white building, with pillared portico; and lying around it are beautiful pleasure grounds, gardens, and conservatories, laid out with the greatest skill and taste. In the flower-garden, in front of the mansion, the beds and borders were glowing with the rich colours of many brilliant varieties of flowers; while southward lay a well-wooded park, over which the view extended to beyond Windsor in the distance. In the large and well-kept kitchen garden, roses and flowers of the herbaceous species were in profusion; and the fruit trees on the walls were hanging thick with magnificent peaches, apricots, and other choice fruits. Among numerous objects of interest was a very pretty Fuchsia Garden—a favourite flower with the late Lady Grenville—which was greatly admired.

A long and most interesting ramble was enjoyed through the extensive grounds; wild and exceedingly picturesque in many

parts, with Nature abounding on every side, while at various points we came across some rare or handsome tree, or group of trees, which brought the leaders of the party to a halt until the rear closed up. Along the Azalea Walk these beautiful flowering shrubs were growing luxuriantly, and many of them had formed great masses fully 20 feet high. Rhododendrons were equally fine, the soil and climate seeming to be exactly suited to the free growth of all the race of what are commonly called "American Plants"—Andromedas, Kalmias, Pernettyas, Gaultherias, Ledums, Ericas, and the like, all appearing to be thoroughly at home. Near the Azalea Walk a grand Cedar of Lebanon, which was estimated to be fully 100 feet in height, had a girth of 10 feet 2 inches.

The "Monarch" of the Conifers at Dropmore is the far-famed Douglas Fir, which was planted in 1830, and has attained a height of 120 feet, with a girth of 11 feet 4 inches at 3 feet up. At 5 feet up, where it was measured to-day, it girthed only 2 inches less. Some of the practical members of the company estimated that it contained 270 cubic feet of clean timber. The seed which produced this grand and now famous tree, supposed to be the largest "Douglas" in Europe, was part of the first lot sent home in 1827 by David Douglas from North-West America to the Horticultural Society of London. It was sent to Lord Grenville in the winter of 1827-28, and, as already stated, it was planted out as a seedling two years later. It is at present in the most vigorous health. Its beautiful fan-like branches, covered with the richest foliage, descend to the ground and have a spread of 63 feet across, and the tree, while it has not added much to its height during the past few years, has steadily increased in girth. Not very far from it grows a second Douglas Fir, reared from seed taken from the tree just described. The younger tree, which was planted in 1843, has now attained a height of 78 feet, and a girth of 8 feet 2 inches. The large Douglas Fir grows in a well-sheltered spot in the grounds at a short distance from the mansion; and Mr Herrin mentioned that every means are taken to protect it from injury, and to encourage a vigorous growth. The natural soil is of a light open texture, on a porous gravelly subsoil, in which trees root freely, but, said Mr Herrin, the Conifers are greatly benefited by a good top-dressing on such a soil, and thus everything in the shape of a barrow-load of well-rotted compost that can be got hold of, is taken to the great Douglas Fir and carefully spread

over its roots, and he had no doubt that this liberal treatment helped its growth very materially. The same method of treatment is carried out here with all the finest Conifers that may benefit by it.

Dropmore also boasts of the largest Chilian Pine, *Araucaria imbricata*, in this country, and probably in the northern hemisphere. It is the king of the glade in which it stands, and commands universal admiration, not only on account of its unrivalled height, but also for its handsome symmetrical proportions, the wavy regularity of its branches, and the fresh green colour of its sharp-pointed leaves. Planted in 1830, it has attained a height of about 70 feet, girths 8 feet 3 inches at 3 feet up, and sweeps the ground with its luxuriant branches in a circle of 38 feet in diameter. It is growing on the filled-up site of an old gravel pit, and consequently enjoys a good depth of soil, which is occasionally top-dressed with rich clayey loam. It stands about 30 yards from a small lake, and from the moist nature of the spot it does not suffer from drought. The tree is the male variety, and produces catkins freely. The male Araucaria is a faster and more robust grower at Dropmore than the female or cone-bearing tree. As an example of this, Mr Herrin pointed to a group of Araucarias, all planted at the same time fifty years ago, in which a vigorous male tree about 50 feet in height was seen towering to fully a dozen of feet above the female trees.

A group of about a dozen fine trees of the Araucaria, that were growing near the great tree on the same kind of gravelly soil, were very much admired. They averaged about 60 feet in height, and were bearing cones freely. It was stated by Mr Herrin that the cones ripened on this group of trees three years ago, and that about half-a-dozen bushels of seeds were gathered from them.

One of the finest Deodar Cedars in Britain, which was planted in 1840, is now a splendid tree 72 feet high, with a stem girth of 9 feet 9 inches at 3 feet up, and a spread of branches 47 feet in diameter. A very beautiful variety of this is *Cedrus Deodara argentea*, a grand specimen of which was shown to us glistening in the sunshine like a tree of frosted silver, 84 feet high and 10 feet in girth, forming a splendid contrast with the more sombre foliaged Conifers near it. It was mentioned that the finest Deodar at Dropmore was destroyed by lightning in 1881. It girthed 12 feet 3 inches, and was believed to be the largest in the country. Boards 38 inches wide were cut from the trunk. A very handsome specimen of *Cedrus atlantica* was seen in perfect

health, which was planted in 1843, is now about 65 feet high, with a girth of 6 feet at 3 feet from the ground.

Among the Pines that were specially noticed were some grand specimens of the Californian *Pinus insignis*, which have assumed stately dimensions. This beautiful Pine, which is rather tender in inland parts in Great Britain, appears to be seldom injured here even in severe winters. The trees were the picture of vigorous health, their rich grass-green foliage contrasting well with that of others around them. The tallest tree, planted in 1839, was 90 feet high, with a girth of 11 feet 1 inch; and another fine example, planted at the same time, girthed 12 feet 10 inches, but was only about 80 feet in height. Mr Herrin informed us that this latter specimen was brought from Chiswick when only a seedling half an inch high, in the waistcoat-pocket of his predecessor, Mr Philip Frost, who for nearly sixty years superintended the planting and nurtured the growth of this splendid collection of Conifers; and his mantle has fallen on an able successor in Mr Herrin.

It would be impossible to mention in detail all the fine specimens of coniferous trees that were inspected in this richly wooded domain. Through the courtesy of Mr Herrin, however, the following particulars are given of a few more of the most notable trees. The measurements were made in the autumn of 1891, and the girth was taken at 3 feet from the ground. The date of planting is given, when known, after the name of the species.

Abies Albertiana, 1861; 58 feet high, and 5 feet 3 inches in girth; with a spread of branches 48 feet in diameter. A lovely tree, with gracefully spreading fan-like branches.

Abies amabilis, 1847; 48 feet 6 inches high, and 6 feet 6 inches in girth. One of the finest of the silver firs, and well furnished from the base to about half the height with healthy branches sweeping the ground. The upper portion of the tree was, however, fast decaying, and had no proper leader. The tree was raised from a cutting, which may to some extent, along with the moist site on which it grows, account for its present condition.

Abies Brunoniana, 1847; 41 feet high; of a spreading, bushy habit, with a circumference of 134 feet round the tips of the branches.

Abies cephalonica, 1843; 71 feet high, and 7 feet in girth. A handsome tree.

Abies concolor, (syn. *A. lasiocarpa*), 1857; 51 feet high, and 5 feet 3 inches in girth. A handsome specimen of a beautiful fir.

Abies grandis, 1861; height, 64 feet; girth, 6 feet; spread of branches, 53 feet in diameter, sweeping the ground. A fast-growing and very handsome tree.

Abies Menziesii, 1841; 73 feet high, and 8 feet 2 inches in girth. A free growing spruce, delights in a cool moist soil.

Abies nobilis, 1835; 71 feet high, and 7 feet 9 inches in girth. A fine vigorous specimen, well branched to the ground.

Abies pectinata; 94 feet high, with a girth of 8 feet 6 inches. A handsome tree.

Abies Pindrow, 1843; 27 feet high. An Indian fir, not at home here, where spring frost frequently injures the young growths.

Abies Pinsapo, 1843; 65 feet high, 6 feet 10 inches in girth; with a diameter of branches 31 feet at the base. A fine ornamental, bushy tree, which thrives well at Dropmore.

Abies Smithiana (syn. *A. Morinda*), 1843; 61 feet high, 7 feet in girth, and 38 feet in diameter of spread of branches. A very handsome specimen of the beautiful Himalayan spruce.

Cryptomeria japonica Lobbii, 1843; 52 feet high. A good specimen of this handsome Japanese tree.

Cunninghamia sinensis; 30 feet high, with a girth of 4 feet 10 inches. An interesting tree, like an Araucaria, but not hardy in most parts of the country.

Pinus Benthamiana, 1843; 56 feet high, with a girth of 6 feet 3 inches. One of the handsomest pines at Dropmore, resembling *Pinus ponderosa.*

Pinus Jeffreyi; 47 feet high, and 4 feet 6 inches in girth. A good specimen.

Pinus Lambertiana, 1843; 71 feet high, with a girth of 8 feet 8 inches. A handsome tree, and one of the best of the silvery leaved pines.

Pinus Laricio, 1829; 96 feet high, with a girth of 9 feet 9 inches. A fine specimen of a forest tree.

Pinus Pallasiana; 96 feet high, and 11 feet in girth. A good forest tree.

Pinus ponderosa, 1829; 85 feet high, and 8 feet 9 inches in girth. A fine specimen of the best of the red pines of North-West America.

Pinus pyrenaica; 86 feet high, and 9 feet in girth. A fine tree of the Spanish pine.

Sequoia sempervirens, 1845; 73 feet high, and 10 feet in girth.

A free growing handsome specimen of the redwood, with the branches sweeping the ground.

Thuja gigantea; 62 feet high, and 6 feet 6 inches in girth. A fast-growing tree, with a graceful spiral habit.

Wellingtonia gigantea, 1857 ; 67 feet high, and 11 feet 3 inches in girth. A very handsome specimen. A number of others were seen not far behind this fine tree, one of which, planted in 1862, had attained a height of 62 feet, with a girth of 12 feet.

The visit to Dropmore had proved a most enjoyable one, and a whole day could have been profitably spent, had time permitted, amid its arboreal treasures. Before leaving, the cordial thanks of the company were tendered to Mr Herrin, who had approved himself a most courteous and intelligent guide to the party over this most interesting estate. He had brought with him the record of the notable trees on the estate, and from its pages he dispensed information to all who sought his aid.

Burnham Beeches.

A short drive from Dropmore eastward, along a pretty country road, brought us to Burnham Beeches, the scene of our next visit. It comprises an extent of about 374 acres, and since 1879, when it was purchased by the Corporation of the City of London for a sum of £6000, it has formed one of the open spaces, or public parks, connected with the Metropolis, and although 25 miles distant, it is now a favourite resort of the citizens. The space is partly an open common, and partly a richly sylvan landscape, in which the famous old picturesque beeches are the main feature, and give name to the place. These grand old trees are familiar to most of us from the numerous paintings and illustrations by eminent artists, in which they figure so prominently.

The poet Gray, the author of the "Elegy," who went to school at Eton, and was buried in Stoke Pogis Churchyard in 1771, was among the first to call attention to the beauties of the landscape, and the weird picturesqueness of the ancient beeches. He says, "Both vale and hill are covered with most venerable beeches, and other very reverend vegetables that, like most other ancient people, are always droning out their old stories to the wind,

> "And, as they bow their hoary tops, relate,
> In murmuring sounds, the dark decrees of fate;
> While visions, as poetic eyes avow,
> Cling to each leaf, and swarm on every bough."

The poet's favourite beech tree, under which it is said he delighted to sit and invoke the Muses, or dream away the day, was pointed out to us on the outskirts of the wood, just as we crossed a brook near the hamlet of Burnham Common. Wheeling to the left, and driving right into the heart of the Burnham Beeches, the carriages were drawn up and the horses unyoked for a rest. In true foresters' style, the party grouped themselves under the sylvan shade of the venerable beeches, and were hospitably entertained to luncheon by Mr Harry J. Veitch. Colonel Bailey, in proposing a most hearty vote of thanks to Mr Veitch for his kindness to the party, took the opportunity to express the satisfaction of the company that the County Council of London had acquired in perpetuity so charming a spot for the recreation of the citizens of the Metropolis.

The company then, under the direction of Mr John Forbes, the custodian of the place, drove along many of the most charming of the grassy rides which intersect the grounds, and saw on the way the most of the curious old pollarded beeches, which are supposed to be from five hundred to seven hundred years of age. A line or two from Mr A. C. Forbes's little book on the Beeches will better explain their characteristic features than any amount of description by a stranger :—

"The beech trees, which render the place so justly famous, are distributed pretty evenly over the whole of the forest. They owe their present unique and picturesque appearance to their having been subjected at some distant period to the operation of pollarding, or lopping off the tops at about 10 feet from the ground, which was done for the sake of the timber so obtained. They do not appear to have been repeatedly subjected to this treatment, as none of them exhibit the scrubby form of growth which is the result of continuous lopping, and, judging by their boles, they appear to have been large trees when they were topped. It is notable that all the trees, with one exception, were pollarded, and that at about the same time, but when and by whom it was done, and for what special purpose, is not known. All the trees are hollow, but owing to the extraordinary vitality of the bark, or wood-forming parts, their shells support, as it were, three or four more trees upon them, for the upper limbs are in many cases very large. Many suggestions have been made to account for this wholesale lopping, but it is a matter of pure conjecture. It is evident that several centuries have elapsed since they were topped, but any estimate of their real age is a matter of so much uncertainty that we shall not offer one. Gray, writing to Horace Walpole in 1737, describes them as being just as venerable as they appear to us now. This lopping has hastened their decay, and caused the trunks to be hollow and grotesque."

The grotesque forms which the gnarled trunks of the great beeches have assumed is undoubtedly one of their most remarkable

charms. One tree resembles, and is called, the "Elephant Beech." We also saw the "Queen of the Beeches"—so called on account of its regal size or status among its fellows; and in the course of our drive there was pointed out to us the "Commemoration Beech," which was planted by the Duke of Buckingham on the 3rd October 1883, when his Grace, with the Lord Mayor and Corporation of London, proceeded to Burnham Beeches to declare the place open to the public for ever. Adjoining the Beeches is East Burnham Common, a wild bit of country covered with bracken, gorse, and heather, with here and there a clump of birch or a solitary Scots fir or juniper. The naturalness of the whole place is one of its greatest charms, and long may it be preserved in all its natural attractiveness to the London picnickers—of whom many happy-looking parties were observed enjoying themselves in it on the day we were there—to artists, and to all other visitors who take an interest in sylvan scenery.

East Burnham Park.

On the way back to Windsor, a halt was called at East Burnham Park, the residence, for about twenty years previous to 1858, of George Grote, the historian of Greece, where many of the famous literary celebrities of the period visited him and his talented wife. It is now the property of Mr Harry J. Veitch, who has been busily engaged since it came into his possession in remodelling the house and offices, and making extensive alterations and improvements in the grounds around his beautiful residence. The tasteful and skilful manner in which the gardens and grounds near the house were being laid out, drew forth great admiration and approval. When the operations are complete, the place promises to be one of the prettiest and most interesting in the county, as it was noticed that only the very choicest and most appropriate of trees and shrubs were being planted for decorative purposes and landscape effect. Among the old tree residenters in the park which are carefully preserved, is a fine old Cedar of Lebanon, of picturesque aspect, with a stem girthing 16 feet at 5 feet up. The freshness and brightness of the place was in strong contrast to the unkempt wilderness we had just left.

Stoke Pogis.

Starting again, the carriages were next pulled up near Stoke Pogis, and the company walked across a meadow by a footpath to

the pretty country churchyard where Gray the poet, the author of the "Elegy," already referred to, is buried. We pass into the hallowed spot by an old carved door. Nearest the gateway is a piece of ground which has evidently been added to the churchyard at a recent date; but lying around the ivy-mantled walls of the venerable church are the graves where—as the poet tells us—

> "Each in his narrow cell for ever laid,
> The rude forefathers of the hamlet sleep,"

with the poet himself now sleeping among them. The poet was laid to rest in his mother's grave, just under the east window of the church, where the tombstone is easily found. The inscription was eagerly scanned by the visitors, many of whom quoted from memory a verse or two of the beautiful "Elegy,"—the opening lines of which are familiar to every schoolboy—

> "The curfew tolls the knell of parting day,
> The lowing herd winds slowly o'er the lea,
> The ploughman homeward plods his weary way,
> And leaves the world to darkness and to me."

A peep was also had into the ancient-looking little Gothic church, with its ivy-mantled tower, high gabled porch, and picturesquely arranged interior, the most striking features of which were a heavy open-timbered roof, panelled in oak, and a curious spiral oaken front to the little gallery. On one of the walls is a monument to Admiral Sir William Penn, the father of the famous founder of Pennsylvania, who was connected with the parish of Stoke. There are some fine old yews and "rugged elms" in the churchyard; and young thorns have been planted along the sides of the main walk. In the park, just outside the churchyard, is a substantial-looking monument to the poet, in the form of a solid cenotaph, about 12 feet high.

Time was flying, and we hurry off again, driving past the thriving county town of Slough, notable as the place where Sir William Herschell erected his famous telescope, and made many of his discoveries. Eton was soon passed through, and Windsor was reached in good time to get tea, and to start by the special train, at 7 P.M., for Southampton.

Leaving Windsor, the railway route is along the valley of the Thames, with Runnymede on the opposite side of the river, and nearer at hand, about halfway between Windsor and Staines, is Magna Charta Island. Lying between the Island and the line of railway

is Ankerwyke, famous for its ancient yew tree, girthing in stem about 28 feet, beneath which, tradition says, Henry VIII. courted Anne Boleyn. Strutt, in his *Sylva*, supposes the age of the tree to be over a thousand years, and says—

> "What scenes have passed since first this ancient yew,
> In all the strength of youthful beauty grew!
> . . . . . .
> Beneath the shelter of this yew tree's shade,
> The royal lover woo'd the ill-starr'd maid."

On the opposite side of the river in Surrey, and not far from the places just mentioned, stands Cooper's Hill College, the present training place of students for the Indian Forest Service. The route to Southampton lies across the county of Surrey, among picturesque valleys divided by low heath-clad hills, and presents many beautiful views, which, however, the shades of evening had closed upon, as well as upon the grassy Hampshire downs, and the fine old cathedral city of Winchester, before they were reached. Little was, therefore, seen of the country on the way to Southampton. The headquarters of the Society were there established at the "South-Western Hotel," for the two days' visit to the New Forest.

FOURTH DAY.

Thursday, 10th August.

THE SOUTHERN DIVISION OF THE NEW FOREST.

Hampshire.

Hampshire and the adjoining county of Sussex are the best wooded—or have the largest acreage of woodlands—of all the counties in England. It need not be assumed, however, that the whole of the area of these "woodlands"—or forests—is covered with a full crop of thriving trees, any more than are the "forests" in the Scottish Highlands, where deer and grouse are the chief "crops" looked for. Still, in this southern part of England, much of the forest land is well wooded, if not heavily timbered, and the district to be visited—the New Forest—lying in the south-west corner of Hants, is of the deepest interest to every arborist, presenting as a whole the largest area extant in England of the ancient

and mediæval forests of Britain. In regard to its picturesque beauties and rich variety of heath-clad waste and sylvan scenery, so much has been written in prose and verse that most people are more or less familiar with them; and only the merest reference need be made to a few of the more prominent as we pass. It may be of some interest to Scottish members to know that Sir Walter Scott composed a part of *Marmion* in the New Forest, while visiting his friend Mr W. S. Rose, at Gundimore Villa, near Christchurch. Mr Rose was also a poet, and the author of the following descriptive lines—

> "Here Walter Scott has woo'd the Northern Muse;
> Here he with me has joy'd to walk or cruise;
> And hence has prick'd through Ytene's holt, where we
> Have call'd to mind how, under greenwood tree,
> Pierc'd by the partner of his woodland craft,
> King Rufus fell by Tyrrel's random shaft.
> Hence have we ranged by Celtic camps and barrows,
> Or climb'd the expectant bark, to thread the Narrows
> Of Hurst, bound westward to the gloomy bower
> Where Charles was prison'd in yon island tower."[1]

Arboriculture in the New Forest.

The history and chief features of the New Forest, from an arboricultural point of view, have been so ably sketched by the Deputy-Ranger, the Hon. Gerald Lascelles, in a report on the *Arboriculture of the New Forest*, drawn up for the instruction of the Excursionists, and inserted in full in the *Transactions* of the Society, that it is unnecessary to refer to them here in detail. After a perusal of that most interesting record, the members will be able to clearly understand the former and present aspects of Arboriculture on the 63,000 acres of Woodlands and Common, which now comprise the Crown property in the New Forest.

It may be remarked that the adjective "New," as applied to the extensive area of Crown lands known as the "New Forest," is somewhat of a misnomer, for there is evidence of the district having been used as a Royal Forest as early as the days of King Canute, in the eleventh century. Every one has read how the Norman Conqueror, William I., turned this extensive tract of country into a hunting-ground, where, as the chronicler of old said, "he hunted

[1] Carisbrook Castle, in the Isle of Wight, where Charles I. and his family were imprisoned by Cromwell and the Parliamentary leaders.

the deer, which he loved as if he had been their father;" and there are few who do not know that it was in a sylvan glade of the New Forest that Wat Tyrel's arrow found a resting-place in the heart of William Rufus.

A great deal of planting was done in the New Forest in the days of the Tudor kings, and it is believed that most of the old oaks and beeches, which are at present the glory of the place, date their existence from the days of Henry VIII. and Elizabeth. According to the best accounts, the Stuart kings, save James VI., did little for it. Renewed interest, however, was taken in the Forest by William III., and it subsequently became one of the most important centres for the growing of oak timber for the Royal Navy. Iron having superseded oak in the building of warships, the same interest is not now taken by the Government of the country in the growing of trees in the New Forest; and at the present time this curious fact has to be recorded, that in this immense tract of Crown property the deputy-surveyor has no power, nay, dare not, by Act of Parliament, plant a single tree in the open Forest. This extraordinary state of matters is the latest outcome of the dispute of centuries between the Crown and those who possess "rights of common" to cut turf and ferns, and to graze their cattle and horses in the Forest. These so-called "rights," shadowy at first, have grown with the years, and were never more strictly enforced than they are at this moment. Some forty years ago, as the result of a Royal Commission which perambulated the Forest and heard evidence, a register of all who possessed commoners' rights was made up, and at the present time there are about nine hundred names upon it. Belonging to these commoners there are about five thousand head of cattle and ponies roaming over the Forest, picking up an existence amid its heathery wastes, or under the shelter of the older woods, and such rights are so jealously guarded that not long since the Lyndhurst Golf Club were threatened with a process of law for making holes in the turf to the damage of the grazings.

In 1851 an Act was passed for planting the Forest, but it was never fully carried into force, owing to the bitter opposition of the commoners and those who made the place a public playground. A good many plantations, however, were formed under that Act, some of considerable extent; but in 1870, as the result of another Act of Parliament, all planting operations were stopped, so that, save in those plantations which are enclosed, there is no chance of the natural regeneration of the woods being accomplished, as cattle

and horses eat up every sapling that manages to push its head above ground.

This state of matters is all the more extraordinary, from an arboricultural point of view, when it is considered that, owing to the vast extent of the Forest, planting could be carried on without the grazing and other rights being interfered with. For example, there are several large plantations of Scots firs laid out twenty-five to thirty years ago, the trees in which are sufficient in size to be beyond the reach of damage by cattle. These plantations could now, with perfect safety, be thrown open to grazing, and a tract of open country similar in size might be enclosed and planted; but such is the state of the law that this cannot be attempted, and, to the great loss of the country, actually nothing is being done to carry on the open woodlands to future generations.

According to the Hon. Gerald Lascelles' report, the total extent of the present Forest comprises in all a tract of 92,395 acres. Of this vast area 27,658 acres are private property, and the remainder is classified as follows:—Open heath and pasture, 40,478 acres; open lands with timber, 4500 acres; enclosed plantations, 11,138 acres; open plantations, 6532 acres; and freehold and copyhold of the Crown, 2089 acres—the Crown property being thus something like 63,000 acres. Of this area, 4500 acres are occupied by old woods, planted prior to the year 1700; 17,670 acres are under plantations of dates varying from one hundred and ninety to twenty-five years of age; 11,000 acres are set down as rough pasture; and the balance of about 30,000 acres has been described by an eminent authority as "unfit for either agriculture, growth of timber, or pasture." The soil of the whole area is a flinty gravel, varying very much in quality, and though heather is growing everywhere, there is not in the New Forest anything like the peaty deposits which are known in the Highlands of Scotland.

Southampton to Beaulieu.

It was arranged that to-day the Excursionists should visit the Southern Division of the New Forest, lying between Southampton Water on the east, Boldrewood on the west, Beaulieu on the south, and Lyndhurst on the north. With such a long and trying journey in the programme for the day, not much time could be given to the exploration of Southampton and its suburbs, although some of the earliest afoot had found their way over

most of the ground. At daybreak the sky was dull and lowering, and looked rather unpromising for a fine day in the Forest. By the time, however, that breakfast was over, and the party had mustered on the pier ready for the sail across the bay, the clouds had dispersed, and Southampton Water lay before us sparkling in the brightest sunshine, as clear and still as the face of a mirror. Our numbers were about as many as the small steamer could accommodate at one trip over the ferry to Hythe, lying on the western shore of Southampton Water. At Hythe, the party were met by a smart four-in-hand, and nine other well-horsed coaches, to convey them on their tour through the New Forest.

The members were quickly in their seats, and starting off at 9.30 A.M., we first drove across Beaulieu Heath, a flat bleak common, to the charming rural village of Beaulieu, situated in a lovely valley at the head of Beaulieu Water, a narrow and picturesque creek of the Solent. For some distance after we left Hythe the country was cultivated and well wooded, but we were rather surprised to see so much Scots fir around us in this southern latitude. We soon learned, however, before we reached the open common, that it is almost the only tree that grows well upon the poorer soils of the Forest. The parching effects of the great drought abounded on every field, and lawn, and furzy common, and the flinty roads, hard and dusty, stretched far out before us across the common, with a conspicuously golden-yellow tint. The wide views of the landscape as we drive across the plain are of a diversified character. Far off on the horizon, and in the hollows, we see the verdant billowy tops of rich woodlands; but nearer at hand there is only a wide expanse of black, hungry-looking moor, covered with stunted heath, the uninviting aspect of which is scarcely relieved by the few scrubby bushes and self-sown pines scattered over it at wide intervals. The numerous ancient tumuli or barrows, for which the Forest is noted, and the small herds of the shaggy Forest pony peculiar to the district, were almost the only objects of interest seen in crossing the dreary common.

Beaulieu.

Reaching more civilised parts, at Hill Top, with its "Fir Garden" and fine clump of old Scots firs, said to have been planted by the Duke of Montagu in 1746, the scene quickly changes. We are now on Beaulieu Manor, and drive down towards the valley through

a charming landscape, the air laden with the perfume of the meadows and woodlands. At the bottom of the valley, and near to the village of Beaulieu, a halt is made to view the picturesque ruins of the ancient Cistercian Abbey, founded by King John in 1204. The Abbot's House has been restored, and is now the residence of Baron Montagu, the lord of the Manor of Beaulieu. The curious old church was the refectory of the ancient abbey. A considerable portion of the ecclesiastical and other buildings connected with the abbey are still to the fore in many carefully-preserved ivy-covered ruins, and were objects of great interest to the visitors. In appearance they are not unlike Dryburgh Abbey, and still show that it was a place of great magnificence in the heyday of its existence, when the monks were famed for their hospitality, wealth, and piety. The whole of the ruins, and the grounds in which they stand, were in beautiful order, due care apparently being taken to prevent injury to the classic fabric.

In the pretty grounds of the Palace House are several fine old Wych elms, one magnificent tree girthing 17 feet 2 inches. At the entrance to the village were several tall, straight-stemmed silver firs, and a particularly fine hornbeam, which here appears to vie with the beech in its stately proportions. The oaks were seen heavily laden with acorns, but few were met with of any size in this district, as they were mostly the growth of the past century, since all were cut down for the Royal Navy that were fit for the purpose before iron and steel came into vogue. The general remark may be here made that all through our journey in the New Forest the abundant crop and the great size of the acorns were the subject of frequent comment. Both shores of Beaulieu Water were heavily fringed with trees, and the picturesque old weir and mill near by the bridge, the quaint, old-fashioned village, with its neat, cosy-looking cottages draped with beautiful climbers, formed a scene of felicity not easily surpassed.

Brokenhurst and Boldre.

The favourite route from Beaulieu through the Forest lies towards Brokenhurst, literally "The Badgers' Wood," that animal being common here in early times. Passing Hatchet Gate and crossing the Heath, splendid views are had of the Forest country and away across the Solent to the Isle of Wight. The village of Brokenhurst is beautifully situated, and possesses a picturesque

old church, dating, it is said, from Saxon times, with a spire that forms a landmark in the country around. In the churchyard is a grand old yew; and several ancient oaks are near by, of great size but now fallen into decay. Three miles to the southward, at Boldre, stands another of those curious old New Forest churches, surrounded by fine old oaks, and the square tower of which forms a conspicuous landmark. In Boldre churchyard lies buried the Rev. William Gilpin, the author of *Forest Scenery*, who was vicar of the parish, and died in 1804. Tradition says that the body of the Duke of Monmouth was secretly brought here after his execution on Tower Hill, London, in 1685, and buried in the churchyard; but Gilpin doubts this, and adds, "Unless he were buried, as might possibly be the case, under a fictitious name."

Beaulieu to Lyndhurst.

Time would not allow of us making the detour by Brokenhurst, and we therefore took the direct route by Beaulieu Road Station for Lyndhurst. Leaving Beaulieu, the drive was delightful for a mile or more along the valley, with the river on our right winding through fresh green meadows beneath umbrageous banks. Anon we leave the Manor lands and again enter the Forest, at Pennerley Gate; and passing through Tantany Wood, the first bit of real forest we have seen, we much enjoy the grateful shade of the tall leafy trees which closely o'erhang the road and break the fierce rays of the noontide sun. Soon, however, we are again out on the wide heath-clad common, with wild nature around us in all its peculiarly attractive features. It was a lovely day, the sun shone brightly, the air was clear though oppressively hot, and the forest scenery, looking its best, was correspondingly enjoyed. As the horses toiled along the yellow, gravelly roads, there was ample opportunity for surveying the scene. From the gorse-fringed road along which we were driving the eye wandered over great plains covered with heather in richest bloom, with here and there a few scrubby trees or ancient tumuli with their rounded outlines, breaking the flatness of the surface. Then the carriages would dive into a tree-clad hollow, and emerge again into the open to disclose the same familiar aspects of scenery. Habitations were few, even in sheltered hollows, and the rough aspect of the sparse population seemed to correspond with their wild surroundings. Herds of cattle and of

Forest ponies were frequently encountered, but otherwise the solitudes seemed unbroken by life. Very few birds were seen, and of game, hardly a head was visible during the whole drive.

At the top of one of the longest and stiffest hills which were encountered, a glorious prospect burst upon the sight. On every side, as far as the eye could reach, was a magnificent amphitheatre of undulating woodlands. The beech was already taking on its golden autumnal hue, contrasting well against the darker foliage of the Scots fir woods, which began to form a striking feature in the landscape away to the northward; while right ahead, upon rising ground, could be seen the spire of Lyndhurst Church and the fine mansion of Northerwood, ensconced in the richest forest scenery.

Crossing the railway at Beaulieu Road Station, we are soon in the midst of the Scots fir plantations on Matley Heath and in Denny Enclosure. These have been planted about twenty years, and are thriving well on the better portions of the land; while on the bare thin soil, in exposed spots, they have a hard struggle for existence. The trees are planted in regular straight lines, like rows of cabbages in a garden, about two paces apart, which gives a certain "corduroy" appearance to the woods when seen from some distance off. This seems to have been the favourite method of arranging the trees in these plantations when they were formed; but it was the general opinion of the company that less precise formality would have been an advantage to the landscape and no loss to the value of the crop.

Situate in the very heart of the Forest, in the neighbourhood of Lyndhurst which we are now approaching, a fine golf course is laid out on the White Moor lying on the right of the road, replete with the smoothest of putting greens, bunkers, whins, and stiveys, that delight the heart of a true-born Scot. A hearty cheer was given to several players of the Royal and Ancient Game, as the carriages passed them. On the outskirts of Lyndhurst we greatly admired the charming Elizabethan villas, with their red-tiled roofs, set amidst the all-abounding greenery on our left. On the opposite side of the road there rises a low grassy hill, called "Bolton's Bench," crowned with an old yew tree where the foresters were wont to assemble in the "brave days of old."

Lyndhurst.

After a most enjoyable drive through an interesting country, the "Capital of the Forest," Lyndhurst,—the Lindhest of Domesday

Book; literally, "The Lime Wood,"—was at length reached, and the carriages drew up at the door of the Crown Hotel about half-past twelve o'clock. By one o'clock, the appointed hour, members were served with an excellent luncheon in the New Forest Hall, by Mrs Jones of the hotel, who proved herself an admirable hostess.

Colonel FRED. BAILEY, R.E., presided, having on his right the Hon. Gerald Lascelles, the Deputy-Surveyor of the New Forest, and Mr Phillips, who had met the party here. After luncheon, the Chairman said: They had had a most delightful drive that morning, and he thought he might promise them a most enjoyable excursion in the afternoon and to-morrow. For the pleasure and profit which they should derive from the inspection of the woods, resources, and beauties of the New Forest, they would be greatly indebted to Mr Lascelles, as well as for the valuable assistance he had already given them in arranging the Excursion. He asked them to join in giving to Mr Lascelles a very hearty vote of thanks.

The Hon. GERALD LASCELLES, in reply, said: The time pressed, they had a long round before them that afternoon, and he should not therefore make a speech. He would only detain them half-a-minute to thank them very heartily for so cordially drinking his health. The New Forest could speak for itself far more eloquently than he could do for it. All that he could do, therefore, would be for him to take them through some of the best parts of it, for the Forest was so large that they could easily organise an excursion every day for a month to some different scene within its borders.

On quitting the luncheon hall, the party walked to the Queen's House, at the top of the village, the official residence of the Deputy-Surveyor of the Forest, and were shown over the Verderers' Hall, an Elizabethan building in which the Forest Court of Swainmote, now called the Verderers' Court, is still held for the settlement of common rights and the granting of game-shooting and other licences. The hall is a most interesting relic, hoary with age, but still in sound condition. It is a well-lighted oblong room, of considerable size, with an old-fashioned brick floor, and furnished with tables and seats of primitive shape, size, and substance. Here, it was first intended the party should have had luncheon, for which purpose it had been placed at the service of the Society by Mr Lascelles; but commodious as it is, the number of members could not be crammed into it, to their great regret, for no other place so appropriate could have been found for a Foresters' gathering. In the hall, Mr Lascelles gave a short and very interesting statement regarding the building. It stood on the site, he said, of the Manor House of Lyndhurst, which was a Royal manor, and was probably as old if not older than the New Forest itself. Part of the present building certainly

dated from the time of Queen Elizabeth. The other part of the mansion, which was occupied by himself as a dwelling-house, was built in the reign of Charles II., and there was an addition to it in the time of Queen Anne. The furniture was probably three hundred or four hundred years old. In the old Dock, which is of solid oak, prisoners still stood for trial. They would see, if they examined it, that apparently no tool had been used in its construction but an axe. Chained to the wall is an ancient stirrup, which tradition says was worn by William Rufus at the time of his death—

> "And still in merry Lyndurst Hall
> Red Williams' stirrup decks the wall,
> Who lists the sight may see."

But the probability was that it belonged to the time of Henry VIII., as it corresponded to the stirrups of that period. It is $10\frac{1}{2}$ inches wide and $7\frac{1}{2}$ inches deep, and at one time, in connection with the government of the Forest, it was put to a curious use. Within the bounds of the Forest no man was allowed to keep a dog which could not go through the stirrup unless it was "expedited"—that is to say, unless it had the ball of its fore-feet cut to prevent it being used in coursing. A little dog that could go through the stirrup was supposed to be guileless of poaching. Needless to say, that the ancient Hall and Dock, and this curious old relic, were examined by the visitors, after these most interesting remarks, with the greatest attention and pleasure. The Verderers' Hall is also now used as the headquarters and armoury of the Lyndhurst Rifle Volunteers.

A hasty run was next made through the parish church, erected in 1861 on the site of an older one, on a mound at the west end of the village, and celebrated for the beautiful fresco of the Ten Virgins, by Sir Frederick Leighton, *P.*R.A. Unfortunately the church was under repair at the time of our visit, and the painting was closely covered up, so that it could not be seen.

The Drive to Mark Ash and Boldrewood.

About 3 o'clock a start was made for a drive in the Forest. The route was south-westerly, and took the party by Cuffnells House, Knightwood, Viney Ridge, and Rhinefield to Mark Ash and Boldrewood—which all lie within a radius of about 4 miles south

and west from Lyndhurst. Our drive, however, represented a circuit of more than double that distance before we reached Mark Ash. A good deal of walking was also accomplished, with Mr Lascelles at the head of the party, examining old and new plantations, admiring the notable trees of the Forest, and the splendid sylvan scenery. As pointed out by Mr Lascelles in his report, —how impossible it is to hope that woodlands open to cattle and horses can reproduce themselves,—we soon had a striking instance of it brought under our notice. On one side of the Forest road the unenclosed oak saplings had every leaf eaten off them ; while on the other, where they had been protected by natural thickets of thorns, amid which the seed had fallen, they were pushing their way upward in a vigorous manner, and promising in due time, if they escaped injury from the ravages of browsing stock, to become goodly trees of the Forest.

But first, it should have been said, that at a short distance out of Lyndhurst a halt was called to enable us to visit the beautifully-wooded policies of Cuffnells, which was formerly the property of the Rose family, of which Lord Strathnairn was a distinguished representative. It is now in the possession of Mr Reginald Hargraves, who takes much interest in the numerous varieties of fine Conifers and hardwoods with which the policies abound. Cuffnells had twice the honour of a visit from George III.—in 1801 and 1804. The park is heavily timbered, and among the notable trees observed in our quick run through a part of it was a grand evergreen oak, *Quercus Ilex*, which girthed 11 feet 6 inches at 5 feet up. Down in a shady dell, where many fine specimens of ornamental Conifers were seen, there was a grand Wellingtonia about 80 feet high, and splendid examples of *Abies Pinsapo*, *Sequoia sempervirens*, and *Pinus insignis*. A Douglas fir, 81 feet high, girthed 10 feet 5 inches; and the oaks and beeches were remarkably fine trees.

Driving through the green lanes of the old Forest, where small herds of the hardy Forest ponies were everywhere grazing, we were anon introduced to the celebrated Knightwood Oak—the Monarch Oak of the New Forest—which reigns in stately grandeur in an open glade in the midst of a fine plantation of thriving Scots firs, planted in 1863. This magnificent tree, which had been pollarded in its youth, girthed 19 feet 9 inches at 5 feet up. The bole was about 15 feet in height, and from it sprang seven gigantic straight limbs rising high in the air, and two great horizontal arms, carefully

supported, the diameter of the spread of which was fully 120 feet.

We next drove off towards Rhinefield, along the new "Ornamental Ride," which has been formed right through a plantation of oak about 500 acres in extent, more than a mile in length, and dropping down into the valley as we proceeded. Standing well back from the grassy margins of the Ride, a beautiful avenue has been formed of the handsomest of the taller-growing species of Conifers, including *Abies Douglasii*, *A. grandis*, *A. Menziesii*, *A. Nordmanniana*, *A. nobilis*, *Cupressus Lawsoniana*, *C. nutkaënsis*, *Cedrus Deodara*, *C. atlantica*, *Thuja gigantea*, and such like, all in fine thriving condition, and promising to make a grand Conifer Avenue in due time. The Ride was made about thirty years ago, and the avenue trees were planted at the same date. We also passed in the course of our drive what had formerly been the Oak Tree Nursery, about 10 acres in extent. When planting was stopped in 1870, the nursery beds were left very much as they stood; and the oaks, although they have since been slightly thinned, are now growing very closely together, and pushing up their heads in a way which promises to make them in the end fine straight-stemmed timber trees.

As we passed through the Forest, the greatly varying nature of its soil was easily observed, as exemplified in the character and quality of the trees growing upon it. In certain places, everything in the shape of a tree seemed to grow with the greatest freedom—hardwoods and Conifers alike—while perhaps at barely a stone throw from these thriving trees, even the hardy Scots fir had difficulty in maintaining an existence, owing to the poverty of the soil, or its pernicious nature for the sustenance of tree life. We drove for a long distance through large woods of excellent Scots fir, which upon much of the land in the Forest seems to produce the most profitable crop of useful timber. The plantations vary from twenty to forty years old, and are thus comparatively young, but their good condition and thriving aspect met the approval of the practical members of the party, and promised satisfactory results when the crops arrive at maturity.

In Vinney Ridge Wood several grand beeches are seen; and the Eagle Oak—one of the old landmarks of the Forest, and scarcely inferior in size to the Monarch Oak in Knightwood—was seen and greatly admired. It is a venerable-looking tree, with a massive rugged stem having the great girth of 19 feet 7 inches at 5 feet up.

Mark Ash.

Recrossing the Christchurch road, we drive through more thriving plantations of Scots fir, larch, spruce, and Corsican pine, and by-and-by we arrive at Mark Ash, one of the best known and the grandest of all the woods of the New Forest. It is about 300 acres in extent, and is said to date from the days of Henry VIII. Here the beech reigns supreme, sole monarch of the scene. The most of these majestic old trees have been pollarded in their early days; but though they have not assumed the grotesque forms of the Burnham Beeches, the effects of the pollarding were viewed with great interest, as to it they owe much of their picturesque appearance, and probably also their longevity. The huge limbs, springing from the pollarded tops, have shot up to a great height; and the wide-spreading umbrageous heads of the gigantic trees have become so interlaced with each other, that even on this brilliant summer day, with the sun pouring down its brightest and most penetrating rays upon the earth, the light beneath these massive beeches was of a dim and subdued character. Only here and there at rare intervals chequered patches of sunlight found their way to the floor of the wood, which was covered with soft springy moss. The scene was marvellously enchanting. The size and grandeur of the beeches, the elastic carpet of green moss on which the foot fell softly, and the "dim religious light" that pervaded the wood, resembling in places the massive pillars and groined arches of an ancient cathedral, were beautiful to behold in the grand solemnity of the place, and made a lasting impression on the minds of the visitors. In all parts of the wood were seen fine clumps of holly, quite enlivening the scene with its glistening green foliage. The holly springs up naturally in all the woods of the New Forest, wherever the young plantlets are safe from nibbling animals; and in many of the enclosures they form one of the chief features of attraction in both summer and winter. One of the great beeches, which had died lately—from some cause which was not easily explained, unless it was due to "sheer exhaustion of the ground," as a practical member was heard to suggest—was measured and found to have a girth of 18 feet 4 inches. Many others were seen in the wood with stout massive boles of about the same girth, the height of which seldom exceeded 9 feet, often much less, to the point where they had been pollarded. This wood, by the way, abounds with adders, and one which crossed the path of the party and was killed, measured 19 inches in length.

The Pinetum.

The closing walk of the afternoon proved to be a long and most interesting one, although, through a misunderstanding of the route, the main body of the visitors drove right on to Boldrewood and missed it. The smaller party struck out through the woodlands, and at a smart pace, under the lead of Mr Lascelles, they greatly enjoyed their ramble through the Pinetum, where all kinds of home and foreign trees of a hardy nature were seen growing in a most luxuriant manner. A large plantation of Deodars and Douglas Firs was examined with special interest. It extended to over 80 acres, and was about fifty years old. It furnished a splendid "object lesson," in respect to the relative merits of these two fine coniferous trees from widely-separated parts of the world, of how they are likely to prove useful forest trees in this country. The experiment is on a sufficiently large scale, and has been long enough at work, to prove, in an unmistakable manner, the superiority in this country, as a forest tree, of the Douglas Fir, from beyond the Rocky Mountains in North-West America, over its beautiful rival, the Deodar, from the sunny slopes of Northern India. Many of the Deodars are showing signs of distress, while the Douglas Firs are pushing ahead in luxuriant style, and will ultimately be the sole crop on the ground. The soil here seemed to be of a character well suited for the growth of most of the hardy Conifers; and the Douglas Fir in particular appeared quite at home in it.

On the party tramped through a long stretch of rich woodlands, in which tree life was seen in the wildest luxuriance. The ferns in places were taller than the travellers, and in some of the more sheltered spots, laburnum and thorn had assumed tree-like dimensions, and even the barberry bushes had run up to the height of respectable trees, their branches being literally covered with beautiful ruddy berries, shining against the darker woodland with excellent effect. In many a cosy corner and well-sheltered spot along the route were seen healthy and vigorous examples of *Pinus insignis*, *P. ponderosa*, *P. Jeffreyii*, *P. excelsa*, and others of the Pine tribe; *Abies Albertiana*, *A. Douglasii*, *A. concolor*, *A. nobilis*, *A. grandis*, *A. cephalonica*, *A. Pinsapo*, *A. Menziesii*, and other Firs and Spruces; *Araucaria imbricata*; *Cupressus Lawsoniana*, *C. macrocarpa*, *C. nutkaënsis*; *Thuja gigantea*; and *Wellingtonia gigantea*; beside many Cedars, Cryptomerias, Sequoias, Junipers, and gigantic Hollies, all commanding a glance of admiration in the passing.

Boldrewood.

Emerging at last from the woods at Boldrewood Green, an elevated spot from whence beautiful and extensive views are obtained over the Forest, a short walk brought the party to Boldrewood Lodge, where the main body of the company had enjoyed a rest while waiting on the detachment coming up. Boldrewood stands at a considerable height, in one of the most charming spots in the Forest, and is a favourite resort of holiday makers. The house was formerly one of the Royal Hunting Lodges, but only a part of it now remains and is occupied as a Keeper's Lodge. Here resided John, Lord Delaware, who in 1745 erected the stone in Canterton Glen to mark the spot where Rufus fell. Many fine banks of Rhododendrons and splendid old trees were seen in the neighbourhood, the famed "King" and "Queen" Oaks being specially noticeable, and a grand old Yew, among many others, girthed at 3 feet up 16 feet 3 inches.

Boldrewood to Southampton.

At this point the return journey to Southampton was commenced. The drive from Boldrewood to Lyndhurst was down a well-made road through a most beautiful landscape, the charms of which must be seen to be fully appreciated. Much of the route lay through the open Forest, with lovely glades and fine old trees spreading out in all their magnificence far away into the deep recesses of the deer-haunted woods. Now we dip to Millaford Bridge, a sweetly rural village, and then sweep up the hill again to Emery Down, from whence the views are wide and splendid. Soon we reach Lyndhurst, and after a short rest to the horses, are again on the way for Southampton. The route is along a perfectly straight road with Ashurst Wood on our right, one of the most beautiful and picturesquely-wooded parts of the Forest, till Lyndhurst Road Station is passed at the margin of the Forest, about 3 miles from the "Capital." After a pleasant drive through a level and well-cultivated country and over the Red Bridge, at the head of Southampton Water, headquarters were reached about 8 P.M., after an exhausting but most pleasant and profitable day in the New Forest.

FIFTH DAY.

Friday, 11th August.

THE NORTHERN DIVISION OF THE NEW FOREST.

Southampton.

To-day another full programme had to be got through, and members required to be up betimes to see the town of Southampton and its famous docks before starting again for the New Forest. Besides the extensive docks, crowded with steamers and ships sailing to all parts of the world, the chief objects of interest in the town are the remains of the City Wall, of which several gates and towers are still standing—the "Bargate" stands in the High Street; the Public Parks, the Avenue, and the Common; the Ordnance Survey Office, Corn Exchange, and Custom House; numerous fine churches, the Hartley Institution, Public Baths, Theatre, Music Hall, and the monuments of Dr Isaac Watts, who was a native of the town, and of Lord Palmerston. The New "Empress" Dock, opposite the South-Western Hotel, was an object of much interest to the visitors. It is 18 acres in extent, with a depth of 26 feet at neap tides, and is supplied with every convenience for storing, loading, and discharging the cargoes of the splendid ships and steamers it accommodates. This fine dock was opened by the Queen in 1890. The two older docks have together an area of 26 acres; and the whole of the 44 acres are enclosed by nearly 1½ miles of spacious quays. Along the water side there is also a frontage of about three-quarters of a mile of commodious quays, with steam cranes, railways, warehouses, and other appliances for working the large shipping trade that frequents the port; as well as for the passenger-steamer service to all parts of the world. For the local traffic, the handsome new "Royal Pier," which was opened about a year ago by the Duke of Connaught, provides ample space, and affords a splendid promenade for the fashionable society of the town. It is 1000 feet in length to the pier-head, and lavish provision has been made for the pleasure and enjoyment of the public, at a cost of about £40,000, so that it is one of the greatest attractions of the place. It may be noted that Southampton Water has the peculiarity of "double" tides; arising from the first influx coming up from the Solent; the

second passing round the Isle of Wight and coming up from Spithead about two hours afterwards, high tide lasting fully that time; an immense advantage to shipping in tidal waters.

In the town the remains of the old walls and towers, which can still be traced across the peninsula between the Itchen and Southampton Water, were objects of great interest. The curious Norman castellated tower and gateway, the Bargate, spanning the High Street, is the most important and interesting of the remains of the ancient fortifications. It is of very early date, probably from the days of the Conqueror, and is pierced by three arches, the centre carriage-way being the oldest, and in it is still seen the opening for the portcullis. The Guildhall over the gateway has been used as a Court of Justice since the days of Queen Elizabeth, and has inside it several very interesting relics of the olden time. The old part of the town has several "Palaces" and "King's" houses, occupied by Royalty in the far past, from "Canute's Palace," the remains of which are seen in Porter's Lane, to that of the Palace of Henry VIII. in St Michael's Square, a large and picturesque building of timber and plaster, said to be about five hundred years old, and still in habitable repair.

The parks and open spaces formed a chief feature of attraction to the visitors, as they are of large extent, and beautifully laid out for the pleasure and amusement of the inhabitants. The Queen's Park stretches westward from the South-Western Hotel to the old Quay, or "Platform," as it is called, in front of the picturesque ancient, ivy-clad South Tower, and before the docks, which lie on the south side of it, were built, it was the favourite promenade of the local gentry. Part of an avenue of fine trees still remains, and the ground is nicely laid out with walks, lawns, and flower-beds, and is much used as a playground for children. There is a fine statue of General Gordon, of Khartoum fame, erected in the centre.

Walking up the High Street and straight onwards for some distance beyond Bargate, the Parks lie to the right of the main street. They consist of several fine enclosures, extending in all to 68 acres, and were first thrown open to the public in 1844. They are well laid out with spacious walks, shaded with avenues of healthy young trees, and furnished with numerous seats on which the townsfolk may rest and enjoy their ease amid pleasant scenes. The largest part is used for various games, drill ground, and such useful purposes, and little attempt at decoration is seen, beyond the

lines and clumps of trees and broad grassy lawns. Towards the east end, however, and particularly in the East Park, the art of the landscape gardener has been skilfully employed with fine effect, and this part is elaborately decorated with statues, fountains, and vases, amid nice parterres filled with the gayest flowers set in beautiful green lawns. The trees and shrubs are of the best kinds, and the whole place does much credit to the taste and intelligent spirit of the Corporation, which provides these parks for the use of the public.

Keeping straight up the hill from Bargate, the Ordnance Survey Office was passed on the outskirts of the town, a large and useful establishment, with no pretensions to architectural beauty; and now we are in "The Avenue," a favourite resort of the inhabitants. It is nearly a mile and a half in length, and chiefly formed of elms from thirty to forty years old. Near the upper end of the Avenue some very fine elms are seen, said to be about one hundred and fifty years old, one of which was 11 feet 4 inches in girth at 5 feet up, with several others about the same size. At the end of the Avenue is the large public park called "The Common," comprising 375 acres of beautifully diversified scenery. It has a finely undulating surface, rising some 200 feet above the town in the highest parts. With a few prettily tree-fringed lakelets in the hollows, and well-wooded in general, it forms a very picturesque and delightful resort for picnic and pleasure parties in the summer. Natural vegetation—in the way of patches of heath and clumps of thorns, holly, briers, gorse, and other indigenous plants—has been wisely allowed to have its share in beautifying the landscape; and the groups of fine old beeches, oaks, elms, firs, and other trees lend their aid in producing a very attractive aspect of rural scenery in close proximity to the busy town.

Drive to Lyndhurst.

Immediately after breakfast the carriages started for Lyndhurst, on our way to explore the Northern Division of the New Forest. Lovely weather again favoured the Excursion. As we drove out of Southampton in the fresh air of a bright morning, the landscape looked its best. On passing through Millbrook, a village on the outskirts of Southampton, the old church was pointed out, and in the burying-ground near by lie the remains of Robert Pollok, the author of the famous poem, "The Course of Time," a native of

Renfrewshire, who died here on his way to Italy for the benefit of his health in 1827. Red Bridge—a corruption of "Reed Bridge"; at the sedgy ford of the river Test, which flows into the head of Southampton Water—is a long and substantial structure, and it is recorded that a bridge was repaired here as early as the year 1270. The vicinity of the bridge was an important centre of traffic in olden times, being the port for the New Forest where most of the timber was shipped, but it is now deserted of every vestige of shipping craft larger than a pleasure boat or fisherman's coble.

A pleasant drive along the road we had traversed the previous evening brought us to Lyndhurst soon after 9 o'clock, where our guides were waiting our arrival. The day's programme was soon arranged, and before 10 o'clock the carriages had defiled out of Lyndhurst for the northern parts of the Forest. The party had again the benefit of the presence of the Hon. Gerald Lascelles, Deputy-Surveyor of the Forest, who accompanied them in all their perambulations of this great Forest area over which he so worthily presides, as also that of his three most obliging assistants, Mr J. H. Dixon, Minstead; Mr J. H. Roberts, Ashurst Lodge; and Mr H. E. Holloway, Holmsley Lodge; who had taken the keenest interest in all the proceedings.

Minstead.

Taking the route by Minstead and Malwood to Rufus' Stone, we drive along an excellent level road for some distance, amid charming forest scenery, with the richly wooded policies of Northerwood rising up on our left to Emery Down, and the site of the old racecourse stretching wide over the level ground to the right. About a mile from Lyndhurst we cross the source of the Beaulieu river, in the midst of the most lovely woodland scenery. A little farther on Minstead Manor House, the seat of the Compton family, is seen on the left, with its stately avenues, fine trees, quiet woodlands, verdant parks, and pretty cottages wreathed in floral beauty—a veritable oasis in the heart of the wild Forest. About three miles from Lyndhurst we pass through the rustic Forest village of Minstead, with a quaintly picturesque aspect about it of the olden time. The parish of Minstead extends to 10,041 acres, but is sparsely peopled, with only about 850 inhabitants, chiefly gathered in the small hamlets scattered over its wide area. The parish church is an ancient edifice, dating from 1250, but it seems to have more than once received an eke in its long history. On the

sign over the village inn is a curious figure called "The Trusty Servant," copied from the well-known picture in Winchester College, the quaint appearance of which is well delineated in the legend beneath it, which reads :—

"A trusty servant's portrait would you see,
This emblematic figure well survey:
The porker's snout—not nice in diet shows;
The padlock shut—no secret he'll disclose;
Patient the ass—his master's wrath to bear;
Swiftness in errand—the stag's feet declare;
Loaded his left hand—apt to labour saith;
The vest—his neatness; open hand—his faith;
Girt with his sword—his shield upon his arm—
Himself and master he'll protect from harm."

Malwood.

Leaving Minstead and its old world traits, amid its pretty gardens and fruit-laden orchards, we turn aside from the road and proceed on foot down a steep lane, cross Fleetwood stream in the bottom of the dell, and ascend the steep hill, through luxuriant woods and shrubberies, to Castle Malwood Lodge, the seat of Sir William Harcourt, the Chancellor of the Exchequer, erected on the site of an ancient British or Roman entrenchment which crowns the hill. Permission was kindly granted to view the grounds, and with the situation of Malwood, the suitability of the Elizabethan character of the architecture to the site, and the tasteful manner in which the policies, extending to about 3 acres, had been laid out, the whole party were greatly charmed. Malwood stands on one of the highest points of the Forest, and commands most beautiful and extensive views of the surrounding country. On two sides, where the trees are tall, vistas have been cut through them with admirable effect; and though the house itself was only built in 1886, the pillars and front of the balcony, and the walls of the house, were embowered in climbing plants in richest bloom. Among the profusion of climbers of the choicest kinds, a fine plant of the somewhat rare *Berberidopsis corallina*, richly laden with brilliant crimson flowers, was much admired. That the climate of this region is mild was seen a few hundred yards from this spot (at Minstead as we passed), where, in a most luxuriant orchard, splendid figs were hanging ripe on standard trees in the open air. A few minutes' walk through the woods, in which were noted some of the famed "White Beeches" of Malwood, and where the thick umbrageous canopy overhead was

smothering the undergrowth, brought us to Stoney Cross ridge overlooking Canterton Valley, and the panorama of rich woodland scenery which unfolds itself from this vantage ground, held the eye enchained by its surpassing beauty. What it would be a month later, when the leaves of the deciduous trees take on their golden autumnal tints, could only be conjectured. In the glorious sunshine to-day, even with the freshness of the summer foliage almost gone, the scene was marvellously lovely.

Rufus' Stone.

We now descended the rough furzy slopes of Canterton Valley to Rufus' Stone, famous in history as the spot where William Rufus was slain by an arrow shot from the bow of Walter Tyrel, on the 2nd August 1100—just 793 years ago. In the olden time this must have been a very secluded part of the Forest, and casting the imagination back over the centuries, one could easily imagine why it had been chosen by Tyrel for the murder of the king. The site of the oak, from off which tradition says the fatal arrow glanced before it struck the Red monarch, is now marked by a triangular stone, about 5 feet high, in a casing of iron, on each of the three sides of which the story of the tragic deed is inscribed. The Stone was originally erected in 1745 by Lord Delaware, who had seen the tree growing on the spot; but having been much mutilated and the inscription defaced, it was restored, in the present "more durable" style, in 1841, by the Warden, Mr William Sturges Bourne. The following lines aptly illustrate the superstitions of the inhabitants of the Forest in former days :—

> "Around the spot where erst he felt the wound,
> Red William's spectre walked his nightly round.
> When o'er the swamp he casts his blighting look,
> From the green marshes of the stagnant brook,
> The bittern's sullen shout the eddies shook:
> The waning moon, with storm presaging gleam,
> Now gave and now withheld her doubtful beam;
> The old oak stooped his arms, then flung them high,
> Bellowing and groaning to the troubled sky."

But the visitor to the place is not allowed long to recite poetry, or to muse in peace under the shady trees, on this historic event. A gipsy family, named Peckham, which has long made the Forest its home, had its caravan all through the summer drawn up under the beeches of this pretty glade, and while a woman with dark eye

and raven locks solicits you to purchase a photograph of the monument, a male member of the family invites your attention to an *al fresco* skittle alley, where for a penny a shot you may try your skill at knocking down cocoa-nuts. So the ancient and the modern mingle. Another gipsy man, dressed in a "horsey" style, directs attention to an arboreal freak—which is not uncommon in the Forest—of a beech and an oak apparently growing from the same root, and, not knowing his audience, gravely explains, to their scarcely suppressed amusement, which is the beech and which is the oak! We had heard much of the Gipsies of the New Forest, but this, the only remnant of the race we met with, did not favourably impress us, although the members of the family were all very civil-spoken people: but perhaps something more picturesque and Bohemian-like was anticipated.

Canterton Valley.

From this famed classic spot we walked along Canterton Valley, which opens up pleasantly to the west, through many green glades and shady nooks embosomed in the woodland. We visited in succession a number of picturesque beech woods, and well-grown oak, and thriving Scots fir plantations of various ages. In nearly all of them there is an abundant undergrowth of fresh glistening-leaved holly, which, it seems, has grown up in an extraordinary way all over the Forest since the deer were removed in 1851. Previous to that time the Forest retained its ancient character of a chase, and from five to seven thousand deer were maintained in it at the national expense. These animals kept down the holly, but since the bulk of the deer were sold off the holly has got the upper hand. There are still, however, it may be said, enough of fallow and red deer in the Forest roaming about in a wild state to furnish some exciting stag hunts, which are followed with great zest by the residents in the Forest. Towards the upper end of the valley, one of the youngest plantations of the Scots fir was entered and examined with much interest, and it was considered an excellent example of a thrifty and well-managed fir wood.

Fritham.

Leaving the valley, we emerge upon Fritham Plain, and strike across it in a north-westerly direction to Bentley Woods. The Forest village of Fritham lies on our right, a very ancient and

interesting place, and near it are seen many relics of the earliest times—Celtic barrows and Roman potteries covering many acres of ground in Island Thorns and Crockle Wood, and also farther off at Sloden and Black Bar. Studeley Woods are famed for their great beeches, and Sloden Wood for its picturesque old yews, occupying the site of an ancient British graveyard. The King's Garn Brook, which drains the district in a south-easterly direction, is celebrated for the rare fossils dug out of its banks, and in many parts it flows through very rugged and picturesque scenery. While crossing the bare, hunger-stricken plain of Fritham, scantily covered with short heath, we saw a practical illustration of the destructive method by which the commoners exercise their right of "turbary," or turf cutting, by skinning off the thin covering of peaty turf which covers the otherwise absolutely sterile ground.

Ocknell Clump of Scots Fir.

Before entering Bentley Woods, there was pointed out, away to the westward, a prominent clump—or "Hat," as the natives call small groups of trees in the New Forest, from their supposed resemblance to the high-crowned hats of former days—of Scots fir, known as "Ocknell Clump." It was the first Scots fir plantation formed, by way of experiment, to ascertain how the tree would thrive in the worst soil and exposure in the New Forest. That was about the year 1776, and since then this tree, so well known in the north, has proved itself to be the best suited of all Conifers for the poor soil of these heathy wastes. It readily sows itself over the Forest, and it would apparently supplant all the other trees if allowed a free run by man and beast. Many thriving patches of self-sown Scots fir are seen springing up in the neighbourhood of where it was earliest introduced, and on many of the barren heaths it is seen growing well where the hardy native birch is unable to rear its head.

Bentley Woods.

It has already been indicated how much the soil of the New Forest varies. A striking illustration of this was again afforded in the course of our walk to-day. On the farther side of the wide expanse of "blasted heath" which we had just crossed, where the dwarf kinds of the hardy willow, and whin, and patches of heather

hardly manage to exist, we arrive at two oak woods which are among the best in the country. They are known as the North Bentley and South Bentley Woods, and have a very interesting history. It is recorded that these two identical woods have been used to grow oak timber from a very early period. A heavy crop was taken off the ground in the time of Queen Elizabeth. The woods were then replanted, and the oak, well matured, was cut down in the reign of William III., in whose days the present trees were sown upon the ground.

The explanation given by Mr Lascelles regarding the regeneration of these two woods was listened to with rapt attention. According to a record still extant, it appears that "pits or beds of three spits of ground each were dug a yard apart, and three acorns planted triangularly in each bed. Half a bushel of acorns were allotted for each person to plant in one day. Two regarders attended every day during the time of planting to see that it was properly done, and after the ground was fully planted with acorns, it was sown with hawes, holly berries, sloes, and hazel nuts. Drains were cut where necessary, traps were set to catch mice, and persons attended daily to reset the traps and keep off crows and other vermin."

These plantations which were thus formed do not seem to have been thinned at an early age, and the trees were accordingly drawn up with a straight habit like larch or pine wood, and though the soil is not first-rate, there is to-day on the ground a greater number of cubic feet of pure oak to the acre than is anywhere else to be seen. This, at all events, was the opinion of the Professors from the French Forest School at Nancy, who, under M. Boppe, with their students, had an excursion through this country a few years ago, and carefully inspected these oak plantations. The trees now run about seventy to the acre in the South Wood, and rather more in the North Wood. They have beautifully clean, straight boles—rising to an average height of about 70 feet, where they begin to form a branching, stag-like head. They commanded the special admiration of the party on account of their sound marketable quality, and though foresters would not probably sow down oak woods with acorns in the same manner at the present day, it could not be denied that the experiment of nearly two hundred years ago had been a great success. Two of the larger trees, measured in the North Wood, girthed 8 feet 4 inches and 7 feet 4 inches respectively, and it was computed that the former contained about 150

cubic feet of timber. The underwoods sown at the time of the planting of the trees—the hazel, the sloe, and the thorn—have all disappeared. A little holly still remains, and the woods are for the most part beautifully carpeted with grass and ferns.

Stoney Cross.

From Bentley Woods the party returned and joined the carriages which were waiting on the Fritham road, and in driving along on the crest of the high ridge towards Stoney Cross, a most magnificent view was had from this elevation, looking far out over a vast extent of waving forests, grassy glades, and dark heath-clad commons. The carriages were left at the pretty little hamlet of Stoney Cross, standing on the top of the ridge, and a favourite resort of visitors and parties on pleasure bent,—and the company walked down the slopes of Canterton Valley to Rufus' Stone. Here lunch was served under the grateful shade of the Forest trees, about half-past two o'clock,—and after the long and trying walk over rough ground in the great heat of the day, every one was ready to enjoy the rest and refreshment.

Colonel Bailey presided, and proposed a vote of thanks to Mr Lascelles and his assistants—Messrs J. H. Dixon, J. H. Roberts, and H. E. Holloway—who had been indefatigable in their courtesy and their kindness to the company during the two days they had spent in the Forest. They were especially indebted to Mr Lascelles for writing and putting at their disposal so excellent a history of the arboriculture of the district. It had been of the greatest advantage to them in their inspection of that extensive Forest, of which they would carry away to their distant homes many pleasant and gratifying memories.

Mr Lascelles, in reply, said he had been only too pleased to welcome them to the New Forest. It had been to him a great pleasure to see them, and to accompany them in their walks. As to the report, he might mention that a great deal of the information it contained had never before been printed. It was quite accessible to the public, only it was contained in old Forest records which were not often consulted. There was an impression abroad that the cultivation of the Forest only commenced in the reign of William and Mary in the year 1700, but that was a great mistake, for they had records to show that planting had been engaged in as far back at least as 1530, and from that date to the middle of the present century there was more planting and more care given to the trees than there had been since. He hoped they would all take away with them pleasant memories of the Forest. He should certainly look back on their visit with pleasure, and he hoped it might not be long before they again visited Hampshire.

After a short rest the company were on the move again towards Stoney Cross, where the carriages were waiting. Here Mr Lascelles bade good-bye to the Excursionists, and a hearty cheer was raised as he departed on his way to Lyndhurst. Seats were immediately taken, and the party drove off, taking the road by Cadnam for Southampton. The views as we passed Malwood and descended the hill were as rich and varied as any that had been seen, and all the way to Cadnam the Forest landscape was of the same charming character as that we had been travelling through for the past two days. We left the New Forest at Cadnam, a quiet rural village, noted for its famous oak, which is said to put forth its buds into leaf on Christmas Eve, like the celebrated Holy Thorn of Glastonbury, in Somersetshire. It was seen growing on a small bit of Forest land on our left as we drove through the village, but at this season of the year it presented no feature to specially distinguish it from any other moderately-sized oak tree. From here the route lay through several rustic villages and a pretty and well-wooded country, where the oaks overhanging the road were heavily laden with acorns. We arrived at the headquarters in Southampton before 6 o'clock, which finished our most delightful and instructive visit to the New Forest. Shortly after 7 o'clock a special train conveyed the party to London, where headquarters were established at the Grosvenor Hotel, Pimlico, for the next three days.

SIXTH DAY.

Saturday, 12th August.

THE ROYAL GARDENS, KEW.

On Saturday morning the members started from the Victoria Station, adjoining the Grosvenor Hotel, by train for Kew Gardens Station, where they arrived at 9.19 A.M. After the hard work of the four previous days, the quietude of the Royal Botanic Gardens at Kew, and the leisurely way in which we were allowed to inspect them, came as a welcome relief. By special arrangement the party,

numbering about one hundred, were admitted to the Gardens three hours before the gates are opened to the public. They were met at the Victoria entrance by Mr D. Morris, F.L.S., C.M.G., the Assistant-Director, who, in the absence of the Director, Mr Thiselton Dyer, extended to the Scottish arboriculturists a hearty welcome to Kew. Mr J. G. Baker, F.L.S., F.R.S., Keeper of the Herbarium and Library; Mr W. Watson, Assistant-Curator of the Gardens; Mr J. M. Hillier, Assistant to the Curator of Museums; and Mr W. J. Bean, Foreman of the Arboretum, were also present, and greatly assisted to add to the pleasure of the company by their courteous attention.

Divided into three companies, under the respective charge of Mr Morris, Mr Baker, and Mr Watson, the visitors spent the next three hours most profitably and pleasantly in viewing the rich arboreal treasures and floral beauties of this splendid Garden, which, to a Society so much interested in the allied sciences of botany, arboriculture, and horticulture, presented many features of attraction. At the gate, on entering, the members had provided themselves with copies of an excellent "Key Plan and Index to the Royal Botanic Garden and Arboretum," which was found of great service to them, by indicating where they would find any object in which they took an interest, and especially the different classes of trees and shrubs growing in the Arboretum. These latter are arranged under their common names—all the species and varieties of oaks, pines, hollies, rhododendrons, and so on, being grouped together, according to their genera, in various parts of the Arboretum —so that is an easy matter to examine any family, and note their characteristic features and distinctive merits. In Simpson's "Guide to Kew," which was also obtained at the gate for one penny, there was such a numerous variety of interesting particulars given regarding these world-renowned Botanic Gardens, that it would be quite superfluous to burden this report with anything like a detailed history of the place. A few particulars of general interest, gleaned from official publications, may, however, be given.

It is recorded that a garden was founded at Kew in 1759, by Augusta, Dowager Princess of Wales, the mother of George III. It was then only 9 acres in extent, and was superintended by a Scotsman, William Aiton—a well-known name in the annals of botany and gardening—the first of a long succession of his countrymen who have been closely associated in various capacities with the development of Kew ever since that period. That Garden so

increased in size and interest under Aiton's management, and the active influence of Sir Joseph Banks, that by the end of the century it was famed throughout Europe for the great collection of plants it contained. The healthy sapling, which was raised and nurtured so well by Aiton, has now developed into a robust and vigorously-growing tree. Kew, as it exists to-day, however, has been formed by the fusion of two Royal properties—Kew and Richmond Gardens. The Royal Gardens of Richmond, which are now merged in Kew, were a favourite resort of Queen Caroline, the consort of George II., and it may not be uninteresting to Scotsmen to recall that it was in them that Jeannie Deans, after her journey on foot from Edinburgh, pleaded with Her Majesty for the life of her sister Effie, as is so touchingly described by Scott in the "Heart of Mid-Lothian." The third Earl of Bute took an extremely active part in developing the botanical side of Kew, and it was he who, about 1760, planted the most of the old trees which still adorn the Arboretum near the main gate. Curiously enough, too, it was an Aberdonian, by name Francis Masson, who was one of the first of the Kew "collectors," who travelled abroad in search of new plants. At the expense of the Kew authorities, he went to the Cape of Good Hope in 1772, and sent home over four hundred species of plants which had not been seen before in Europe. This excellent practice of sending collectors to different parts of the world continues, and by its means Kew is greatly enriched.

The Gardens, as they exist to-day in their great extent and variety, are the result of the labour of many hands, but the name most associated with them is, of course, that of Professor Sir Wm. Hooker, who in 1845 resigned his position of Regius Professor of Botany in Glasgow University, to become Director of Kew. At that time the Gardens were only 15 acres in extent. They now include nearly 300 acres. Over two hundred men of all grades, about sixty of whom are professional gardeners, are employed in them. There is an annual grant from Parliament of £22,000 for their upkeep; and growing in the open air or under glass there is a collection of the flora of the known world, unsurpassed in any other country. Kew, in fact, is the floral Mecca of the world. It is at once a great educational and a pleasure resort, and it is satisfactory to know that, though it is visited by Londoners in their thousands every week, and in their tens of thousands on bank holidays, it is an exceptionally rare thing for the flowers or trees to be in any way damaged. Sir Joseph Hooker succeeded his father as Director,

but resigned the office several years ago, when Mr Thiselton Dyer was appointed in his stead. The veteran botanist, however, though now over seventy years of age, comes a railway journey of over 40 miles nearly every week-day to work in the Garden at his favourite subjects. Mr Thiselton Dyer and his able assistants worthily maintain the best traditions of Kew, and to-day the Gardens have deservedly a world-wide fame.

It would be impossible to mention in detail all the interesting plants and flowers seen by the parties in their walk through the Gardens. The palm-house was found a veritable tropical forest in miniature. The monarch of the collection is a giant Fan Palm, *Sabal Blackburniana*, which was said to have been brought from the West Indies by Admiral Bligh in 1793. It has thus attained its century at Kew, and is still in vigorous health. In the tropical house every flower seemed more wonderful than its neighbour. On the occasion of our visit, one of the greatest rarieties seen was a plant with the name of *Aristolochia Goldieana*, which had an immense flower, 18 inches by 12 inches, fully expanded. It is rather curious that about the same time a great sensation was caused in Edinburgh by the flowering at the Botanic Garden for the first time of a similar plant of *Aristolochia*, which had been got by Professor Bayley Balfour from Kew. Another very interesting place was the Water-Lily House, where, besides a host of other beautiful aquatic plants, the Royal Water Lily, *Victoria regia*, was seen in all its queenly splendour; its immense round leaves resting on the surface of the water, in a large tank, like gigantic embossed bronze trays, with the snow-white flowers floating in the spaces between them, in lovely contrast. There were also seen growing in great luxuriance, in the same house, a fine collection of "the Gourds of the World," comprising many curious productions of nature, among which the "Snake Gourd," with a screw-like body and the brightest flamingo-red colour, attracted special notice.

As the parties passed along, attention was paid to the more remarkable trees in the grounds of the Botanic Garden, many of which are historical trees, or noteworthy examples of their kind. Much regret was expressed at the disappearance of the celebrated tree of *Araucaria imbricata*, which formerly stood on the lawn near the large conservatory, and was well known to every arborist who had visited Kew. It was one of the five original plants which Archibald Menzies introduced from Chili in 1793, and which had

thus, like the West Indian Fan Palm already mentioned, reached its centenary when it died, about a year ago, and was removed. Its romantic history has been often told—Menzies, dining with the Spanish Viceroy of Chili in 1792, secured a few nuts that were served at table, and which were new to him. His sowing them on board ship in a box of soil, in which they germinated while on the voyage of discovery round the world with Vancouver, and safely landing the plantlets in England, was a feat worthy of being recorded by the living tree, now, alas! gone.

Time would not permit of the measurement of many specimens; but among the few that were girthed with the tape as we passed was a fine example of the common Holly about 40 feet high, with a girth of 4 feet 3 inches at 5 feet up. The old walnut tree, near the Rock Garden, is 11 feet 2 inches in girth. It is a mere shell, but in order to preserve it as long as possible from the effects of the weather, the gaps in the trunk have been filled in with bricks and cement and the exterior coated over with tar, coloured to resemble the bark. This novel method of tree preservation was viewed with much interest. A very good specimen of a Californian pine—*Pinus macrocarpa*—in fine foliage, was 7 feet 6 inches in girth; and the first Corsican pine planted in the Garden had attained to a girth of 12 feet 6 inches—this measurement, however, including the stems of a Clematis, which were closely twisted round the bole. Another splendid example of the same pine—*Pinus Laricio*—is 90 feet in height and 9 feet in girth. The great Turkey oak, *Quercus Cerris*, growing near the Temple of the Sun, which was brought by the Earl of Bute from the Duke of Argyll's woods, near Hounslow, in 1762, girths 13 feet 5 inches. A fine example of the Maidenhair tree, *Salisburia adiantifolia*, is 9 feet 8 inches in girth. A gigantic beech tree is 11 feet 6 inches in circumference, and has a spread of branches over 100 feet across; while the tallest tree in the Garden, a lime, is over 100 feet high. A run was made through the Museums, which contain upwards of 40,000 specimens, many of them of the most interesting description. The party also inspected with great interest Marianne North's Picture Gallery, which contains a unique collection of floral and arboreal studies from nature, painted by that gifted lady in many lands.

In the Arboretum, which is only separated from the Botanic Garden by a wire fence, the several parties spent a considerable portion of the time in inspecting its rich stores of arboreal subjects

of first importance to them, and of which each member took his own notes. Representatives of all families of trees and shrubs that will grow in the British Isles were seen and examined with the greatest interest. The names of all were plainly written on labels that could be easily seen and read, and as the members walked about they had no difficulty in comparing the species and varieties of any class of trees, and forming an opinion of their beauties and merits. The collection of Conifers, new and old, were a particularly interesting feature, especially in regard to the number of species rarely seen in Scotland. Numerous fine varieties of the hardier kinds were also noted, although many of them were not by any means so healthy in appearance and vigorous in growth as they are commonly seen in Scottish woodlands. Still there were some very fine specimens noticed in the collection, particularly of those that delight in a warm climate, and can bear with impunity the London fog, which is so detrimental generally to the coniferous family. The broad-leaved trees do not suffer nearly so much from the deleterious properties of the fog, and they seem to thrive and grow with great luxuriance at Kew, fringing the lake, lawns, and glades with a rare wealth of sylvan beauty, in all its varying tints and shades. The vast collection of evergreen and deciduous shrubs were looked upon with equal admiration, and days might have been spent among them without exhausting their attractions or the interest in them flagging. Near the Rhododendron Dell was seen the site of an old gravel-pit which had been skilfully converted into a natural-looking hollow, in the shelter of which were planted a collection of bamboos of every description. The planting had only been completed this season, but the bamboo "canes" presented quite a novel appearance, giving one a good idea of the luxuriant growth and gracefulness of tropical vegetation. It was greatly admired as an excellent method of transforming a very ordinary looking spot into one of rare beauty and great interest.

The several divisions of the party having made the circuit of the Arboretum and Gardens, gathered on the lawn near the Pagoda—an Oriental-looking building of ten stories, and about 165 feet high—and, at the Pavilion Tea Rooms, they were hospitably entertained to light refreshments, which were gratefully appreciated after the long and most interesting walk they had enjoyed in the Gardens on a very warm forenoon. Here Colonel Bailey, on behalf of the members, cordially thanked Mr Morris and the other officials

of the Gardens for their great kindness and courtesy in conducting the parties round the Gardens, and showing them so much to remember of Kew and its marvellous treasures. Mr Morris briefly replied, and expressed the pleasure it had given the Kew officials to receive so large a party from Scotland interested in the same studies as themselves. On their way to the Victoria Gate, the attention of the party was directed to the tall flagstaff in the Gardens, which is 162 feet in height, and was cut in Vancouver Island from a single tree of Douglas fir, *Abies Douglasii*. This monster spar is said to weigh 4 tons 8 cwts. 2 qrs., and is believed to be the tallest "tree," alive or dead, in the United Kingdom.

THE FORESTRY EXHIBITION.

From Kew Gardens Station the company travelled to Earl's Court, and by invitation paid a visit to the Exhibition of Gardening and Forestry which was being held there. They were met and welcomed by Mr H. E. Milner, chairman of the Exhibition Committee, who was accompanied by Dr Maxwell T. Masters, Professor Curtis, Mr H. Turner, chief of the Gardening Department; Mr George Cadell, chief of the Forestry Department; Mr J. Wright, Mr B. Wynne, and a number of other gentlemen interested in the Exhibition. Soon after their arrival the company were entertained to luncheon in one of the pavilions, Mr Milner being in the chair.

The CHAIRMAN, in proposing "Prosperity to the Royal Scottish Arboricultural Society," said it was with great pleasure that the Directors welcomed the members of that Society to the Forestry Exhibition, to see what had been provided for the profit and amusement of the people. That they were able to hold a Forestry Exhibition in London at that time was largely due to the work which the Royal Scottish Arboricultural Society had prosecuted in the north so successfully for so many years.

Mr DUNN, in responding, thanked the Directors for their courteous invitation to the members of the Society, of which so large a number of them from Scotland had been able to take advantage. This Excursion to the South was an occasion which would go down in the records of the Society. The members had reaped greater benefits on this than on any previous excursion, and they had been enabled to store their minds with knowledge which they could not easily acquire at home. He did not say that arboriculture had been so closely followed in England as in Scotland, but there were many notable instances where forestry was very well done in the South. They had seen some of these, and if forestry only received more encouragement

from their southern friends, it would produce better and more profitable results.

Mr Dunn then gave "Prosperity to the Gardening and Forestry Exhibition." He said the members of the Society gratefully appreciated the privilege they had received to view this attractive exhibition of industry and art, combined with the healthy relaxation and enjoyment of the people. He was sure their members would examine with interest the notable exhibits in the Forestry Court, with which they could claim a kind of family connection through their esteemed friend and member, Mr Cadell, to whose exertions they were aware much of the success attending the Forestry Section was due. The Gardening Section was of special interest to many of them, and the great extent and variety of the General Exhibition would find them in abundant work and amusement in seeing it all that afternoon. They cordially wished that the greatest success might attend the efforts of the Directors, to whom they felt much indebted for their kindly reception and the hospitable manner in which they had been entertained.

The Chairman, in responding, said the Directors had endeavoured to interest the public in the subject of forestry. In this work they had received help from nearly all the learned societies, and from Her Majesty's Commissioners of Woods and Forests, and others who had sent in many very interesting exhibits, which they would have an opportunity of inspecting in a few minutes. The Queen had sent from Balmoral some very beautiful and interesting specimens from the Royal forests. The Forestry Court had been arranged by their excellent friend Mr George Cadell, who was associated with the very successful Forestry Exhibition at Edinburgh in 1884.

This being the last occasion on which all the members would be together, Colonel Bailey proposed a vote of thanks to the Secretary of the Society, Mr W. J. Moffat, and expressed their sincere appreciation of all that he had done for the comfort of the party during the course of the Excursion. A similar compliment was paid to Mr Cadell on the proposition of Mr James Watt, J.P., Carlisle; and Mr Charles Buchanan, County Councillor, Midlothian, proposed "The health of the Chairman," Mr Milner, which was cordially pledged.

After lunch, a visit was paid to the Forestry Court of the Exhibition, where Mr Cadell and Professor Curtis, of Downton Agricultural College, pointed out and described the exhibits of special interest, and illustrative of the general features of the collection. As a whole, the Forestry Section was a very interesting display, and although on a comparatively limited scale, there were many excellent exhibits of the products of forests and of the science and art of forestry. The whole of the numerous attractions of the Exhibition—including Captain Boyton's wonderful display on the water—was thrown open to the party, the members of which spent the afternoon within the precincts of the building.

The visit to the Exhibition finished the programme of the Excursion, and about half of the members returned to Scotland by the trains from Euston Square on the same evening. The railway tickets being available, however, to return by any train from Euston to Edinburgh until August the 21st, the rest of the members remained till Monday to visit Hatfield Park and Woods.

SEVENTH DAY.

Monday, 14th August.

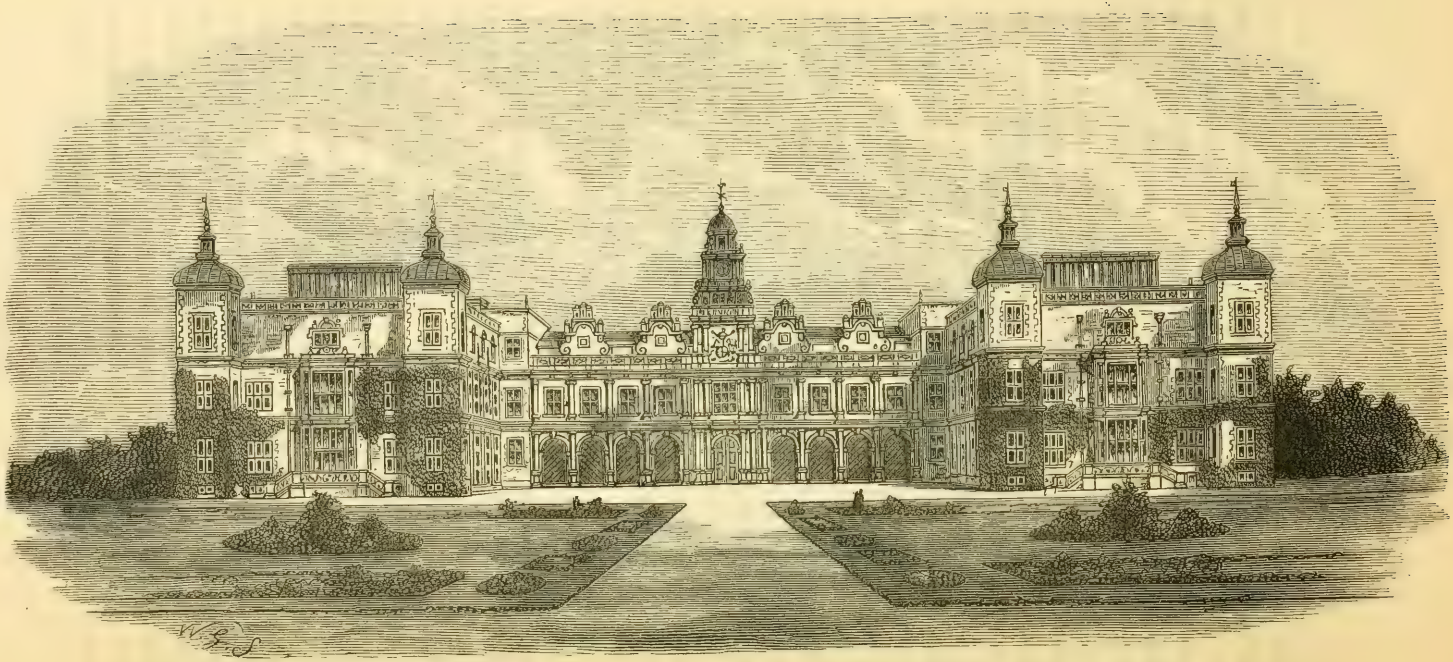
HATFIELD.

By the kind permission of the Marquis of Salisbury, the members of the Society had an opportunity to-day of inspecting the woodlands of Hatfield, the ancestral home of the Cecils. Though the Excursion had already been protracted far beyond its length in former years, about fifty Scottish members of the party remained in London over Sunday in order to join in this particular trip, the mention of which had been received by all with much satisfaction. The good fortune of the past week in the matter of lovely weather did not desert the party, who were again favoured with a charming day. Leaving the Victoria Station by the Underground Railway at half-past 8 o'clock, the company had a narrow escape from a railway accident, just outside King's Cross Underground Station—the only mishap which had been threatened on all their journeyings by road and rail. In going up the steep incline to King's Cross, the engine appeared to be unable to pull the dead weight of the train, and came to a standstill. A minute or two afterwards, another train came dashing along the tunnel behind it. Loud shouts were raised by some railway officials. Red lanterns were waved in the darkness, which fortunately were observed by the driver of the second train, who pulled up, but only about a dozen yards behind the last carriage. In the circumstances, all were very glad to get out of the tunnel into the open air again. From King's Cross Station, Hatfield was reached in about half-an-hour's run.

Hatfield House.

There are few of the stately homes of England better known to fame, or which have more historical interest attached to them, than Hatfield, in the county of Hertford. The domain appears to have first come into note in the time of King Edgar, when the Manor of Hatfield, which had been part of the demesne of the Saxon princes, was presented to the Abbey of Ely. The Abbey was made a Bishopric by Henry I., and Hatfield became a bishop's residence. The old palace was built by Morton, Bishop of Ely, between 1479 and 1486, but the only portions remaining of the ancient structure are the gateway and the banqueting hall, the latter, with its lofty ribbed Spanish-chestnut roof and quaint corbels, being now used as stables. Henry VIII. took a fancy to Hatfield, and when Thomas Goodrich wished to become Bishop of Ely, the king granted his request only on the condition that Hatfield should revert to the Crown in exchange for some other lands near Ely. In 1538, accordingly, Hatfield became Royal property, and there Henry occasionally resided. Edward VI. is said to have been at Hatfield when he received the news of his accession to the throne; and at this Royal residence the Princess Elizabeth, afterwards Queen Elizabeth, lived in retirement during the latter years of the reign of her half-sister Queen Mary. She was sitting under an old oak tree, which unfortunately is now quite dead, when she received the news of the death of Mary and of her accession to the throne.

The transference of Hatfield to the Cecils was effected by another whim of the reigning sovereign. When James VI. of Scotland and First of England was travelling from Edinburgh to London to assume the English Crown, he rested at Sir Robert Cecil's house of Theobalds, also in Herts, about 8 miles south-east of Hatfield, and took such a fancy to it that in 1607 a deed was signed exchanging Hatfield for Theobalds. Since that date Hatfield has been held by the direct line of the famous Cecil family. It was Sir Robert Cecil, the second son of the great Lord Burleigh, and afterwards first Earl of Salisbury, who built the present mansion-house. Begun in 1605, it was finished in 1611, and it seems from the bills still extant that the whole cost of the magnificent structure was only £7000. The Earl, however, is said to have been his own architect and builder, and to have carried out his plans with his own workmen. The mansion-house stood as it had been built until 1835, when



HATFIELD HOUSE: VIEW OF SOUTH FRONT.

in November of that year a fire broke out in the west wing, which was burnt to the ground. In the conflagration, the Dowager Marchioness of Salisbury, the grandmother of the present Marquis, was burnt to death—the fire having originated in her bedroom. The wing was rebuilt according to the original design, and to keep it from having a new look, the last marquis caused the foundation of the west wing to be dug up and the old bricks used for the new superstructure. The south front, which takes the form of three sides of a square, and of which the engraving gives a capital illustration, is the principal elevation of the mansion-house. It has many pleasing architectural features, and is greatly enhanced by the fine Magnolias and other beautiful climbing plants, which now cover a considerable area of the walls. Such is a short sketch of the history of this princely residence.

The New Drive.

At Hatfield Station the party were received by Mr Miller, estate agent, and by Mr Barton, chief forester. They entered the grounds by the richly designed wrought-iron gates, with handsome carved stone pillars, facing the station, and proceeded along the new avenue, which was made by the present Marquis in 1877. The old road to the mansion-house was through the village of Hatfield, up the steep eminence on which the church stands, and through the old gateway already referred to. The new drive, which is carried a part of the way over a deep hollow in which a portion of the village lies, is a splendid piece of work, and for one thing it gives the visitor an opportunity of seeing the stately mansion-house and its surroundings long before he reaches it—an advantage to which the old roadway could not lay claim. These first impressions are admirable. On the left is a beautiful broad stretch of green sward, bounded by a splendid avenue of limes; on the right of the avenue are shrubberies and plantations which screen the boundary wall, and right ahead is the mansion-house, the north front of which, though differing in its arrangement from that of the south, has likewise a dignified and reposeful aspect.

The Lion Oak.

The first interesting tree seen on the walk towards the mansion-house was the "Lion Oak," a grand old tree with a short massive stem, as shown in the illustration, which stands near the

wall on the right of the carriage-way. Though now almost a ruin, it is still reluctant to part with life. Why it is called the "Lion Oak" does not seem to be known. It is said to be mentioned in Domesday Book, and in its prime it must have been a veritable

THE LION OAK.

giant among the trees of the wood. What remains of the grand old bole girths 32 feet 6 inches. Many gaps in it have been filled with cement, but, although this is so, three great limbs, which spring from what has evidently been a pollarded top, are still clad with a wonderful crop of healthy foliage.

Ancient and Modern.

An inspection was next made of the remaining portion of old Hatfield House and the old tennis court. In this neighbourhood also an opportunity was afforded of inspecting the plant by which the mansion-house is supplied with the electric light; and the company heard with interest that at another part of the estate, electricity, generated by the water of the river Lee, is used for all farm purposes, such as thrashing, turnip-cutting, and such like. Among things which were much admired by the visitors interested in estate management, were the excellent cottages which the Marquis has built all over the property for the accommodation of his work-people. They are erected on what is known as the "Richmond" plan, and this year alone some forty have been built. Like a villa, they have a ground and first floor, and contain two public rooms and three bedrooms, not large, but exceedingly comfortable and

well arranged, with all necessary conveniences. It was stated that the cost of a double cottage of this kind was about £420. Just under the wall of the old refectory, shaded by the spreading branches of an old walnut tree, it may not be uninteresting to mention, is the grave of the Duke of Wellington's last charger, a son of the famous "Copenhagen," which he rode at Waterloo. It was presented by the son of the Iron Duke to one of the Salisbury family in 1852, and the steed dying in 1861, it was buried here.

Hatfield Domain.

It being explained that the whole of the estate was open to the company for their inspection, they at once proceeded with the work. The home park of Hatfield is about 1500 acres in extent, with 3000 acres of woods beyond it. The park is beautifully timbered, and is studded with many very fine trees. The oaks especially, of which the illustration shows one of the finest of the

OLD OAK.

ancient trees still standing in the Town-bottom Wood, grow well in the clayey soil, and many of the trees are of considerable antiquity. The oak woods are magnificent, and the whole of the woodlands are managed on an admirable system which gives the best returns. All over this splendid domain there are evidences that the Marquis of Salisbury is as good a forester as he is a statesman, and that he not only takes the keenest personal interest in the management of this fine estate, but has people under him who can carry out his enlightened views in an able and satisfactory manner.

Taking the road past the estate offices and the residence of Mr Miller, the walls of which were hanging thick with the ruddy berries of the Pyracantha, *Crataegus Pyracantha*, the party first paid a visit to the home plantation—a mixed wood, chiefly of ash, larch, and oak. Here were seen a number of well-grown Cedars of Lebanon. One fine tree girthed 10 feet 2 inches, and another grand specimen—the largest cedar in the place—measured 13 feet in girth at 5 feet up. Arriving at Mr Barton's neat villa-like residence, designed from a photograph, taken by Lord Salisbury, of a cottage at Puys, near Dieppe, in France, light refreshments were kindly provided for the party; who had also the opportunity here of inspecting one of the Marquis's recently built "Richmond" cottages. Hard by is a nice avenue leading to the rectory, and down one of its alleys is the piggery, where about one hundred swine are kept. Milwards Park Wood, of about 360 acres, is planted with oak, now about eighty years of age—among them being a few of much older date. This, and all the woodlands on the estate are "cropped" on a twelve years' rotation, and in this way the most is made of the timber. Some promising young plantations of larch and oak were also seen in this locality—planted out from the home nursery, and thriving splendidly. A grand old beech that was seen had a girth of 19 feet 6 inches.

The Duke's Drive.

The Duke's Drive, as it is called, was the next striking object that was inspected and greatly admired. It starts from just beyond the flower garden on the south front of the mansion—where stand a pair of handsome metal gates and posterns, made in Paris, and very richly designed—and stretches away in a straight line due south through the park for fully 2 miles. It is a stately avenue, with a broad grassy drive between the trees, of the same width as the courtyard in front of the mansion. The wide, soft, green turf is bounded by rows of pollarded limes, which on the occasion of our visit were in splendid foliage, and formed a delightful far-stretching vista. From the top of the Duke's Drive, which was formerly the highway to London, an excellent view is obtained of Hatfield.

Proceeding on our tour of inspection, the Combe Wood was found heavily timbered with the finest oak. Indeed, the oak woods on this estate probably equal in weight of splendid

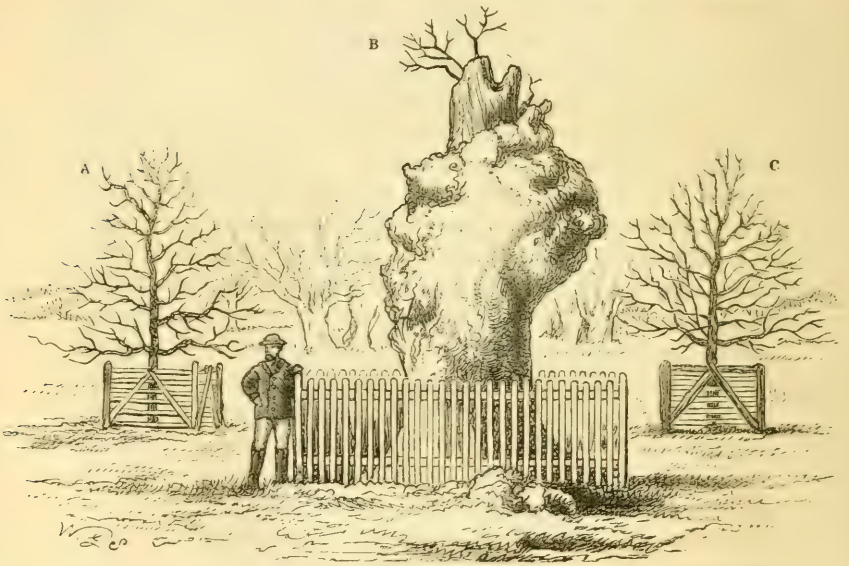
timber, if they do not surpass, those of the New Forest. One of the old oaks had a magnificent bole 20 feet in height to the branches, and girthing 16 feet 10 inches at 5 feet up. It was estimated that it contained about 550 cubic feet of timber. Hornbeam and larch also thrive well in this wood, in which likewise occur some fine examples of the Douglas fir. An oak in the centre of the wood measured 16 feet 4 inches in girth. We passed through the deer park, where, among the tall bracken, could be seen the deer sheltering themselves from the fierce rays of the sun. At another point, where the park was clear of undergrowth, a line of flags marked out a golf course, where the Marquis and the Right Hon. A. J. Balfour, his nephew, play the Royal and Ancient Game.

The Conduit Wood, to the east of the house, was examined with great interest. It is mentioned in Domesday Book as containing two thousand oak trees, and giving pannage for two thousand swine. The oaks, growing in a strong clayey soil, stand now about forty to the acre, and are admirable timber trees. One measuring 12 feet 3 inches at 5 feet up had a clean bole of 50 feet to the forks. A very instructive visit was afterwards paid to the Brick-Kiln Wood, which was planted by Mr Barton about twelve years ago with oak, ash, and larch. The ground had been deeply ploughed, and drained, before the trees were put in. Foresters will recognise at once how well the trees have grown, when it is mentioned that the tallest larch is now 32 feet, and that on an average all the trees in the wood are fully 20 feet in height. In our walk in the vicinity of the Brick-Kiln Wood—where, by the way, the badger is still an inhabitant—we came upon an Italian poplar, *Populus monilifera*, about 120 feet in height and 8 feet 8 inches in girth, with the mistletoe growing freely upon it; a splendid larch, 80 feet high and 8 feet 6 inches in girth; and a plantation of about 6 acres of the Spanish silver fir, *Abies Pinsapo*, and other Conifers, doing remarkably well.

Queen Elizabeth's Oak.

Our perambulation of the park brought us by-and-by to an old oak tree which links the present with a very interesting period of past English history. This is Queen Elizabeth's oak (fig. B in illustration on next page). In an account of Hertfordshire trees in the *Flora Hertfordiensis*, the editor says: "Hatfield Park

abounds with grotesque old trees, of which the most noted is the tree known as Queen Elizabeth's oak. We applied to the Marquess of Salisbury for an authentic history of this tree, and his Lordship obligingly replies: 'I am afraid that the only account I can give of Queen Elizabeth's oak is that it was reported to be the limit of her walk when confined, during the latter years of Mary's reign, at Hatfield, and that she was sitting there when her sister's death was announced to her.' An Avenue of Limes has been planted up to it apparently to



A TRIAD OF ROYAL OAKS.

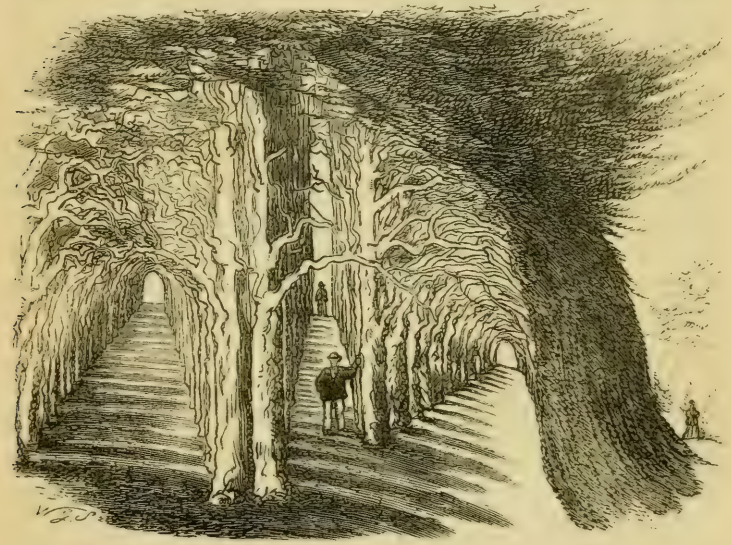
A, Oak planted by the Queen. B, Queen Elizabeth's Oak. C, Oak planted by Prince Consort.

commemorate the fact." The tree, which is a pollarded oak, is now a dead shell, but, needless to say, it is most carefully preserved. A great portion of the trunk has been protected by a lead covering, and it is enclosed by a stout fence. It has not a single green bough of its own, but out of its highest point is growing a fresh young sapling from a self-sown acorn, and if its roots manage to reach the soil, a likely enough possibility, it will carry down the succession through many future ages. When Queen Victoria visited Hatfield in 1846, she was much interested in this venerable historic tree, and as a memento of her visit, it is said,

she had a small branch lopped off from the trunk. Another account says that she got the last acorn borne by this ancient and historic oak.

The Vineyard.

The Lime-tree Avenue referred to by Lord Salisbury is of considerable antiquity. It leads from Queen Elizabeth's oak in one direction to the mansion-house and in the other to a most delightful part of the policies called "The Vineyard," which we next inspect. Here there is seen a curious series of old yew-tree avenues, as shown in the illustration, radiating down the slope



RADIATING AVENUES OF TRAINED YEWS.

to the river Lee, which waters the domain. One of the yews measured was 12 feet 9 inches in girth at 2 feet up. There is a summer-house on the crest of the slope, and from it down through the yew avenues most lovely peeps are obtained of the river, here broadening into lake-like dimensions set in a most beautiful landscape, which commanded great admiration. We were punted across the Lee to the old garden on the north side, formerly the Vineyard—a quaint, old-fashioned, secluded place, which was once the orchard and kitchen garden of the establishment, but it has been superseded for some time by a new garden

nearer to the mansion and more easy of access. In a broad channel led from the river, lovely white and yellow water-lilies were growing abundantly; and in the borders of the garden were numerous trees of apples, pears, plums, damsons, and medlars, hanging thick with the most luscious fruit. The high old brick walls of the garden, which formerly were covered with fruit trees, are now planted with a collection of all the choicest varieties of hardy climbers, which will have a beautiful effect when they have fully draped the surface. Within the walls, a useful home nursery has been formed, which was full of an excellent selection of healthy young stock.

The Warren plantation adjoins the Vineyard, and is about sixteen years old, a fine thriving mixed wood. An oak near the keeper's cottage is 32 feet in girth. A vigorous plantation of 6 acres of young ash was seen hard by the Hertford Road, and near it is a fine sycamore avenue which leads to the mansion-house. This finished a pretty complete perambulation of the home park and woods, during which many things to interest and admire were seen. Much approval was expressed in regard to the manner in which the parks and woodlands are looked after; and it was generally agreed that Hatfield, in all respects, had come up to the high expectations formed of it by the company.

At two o'clock the visitors were entertained to a sumptuous luncheon in the Red Lion Hotel, about sixty gentlemen being present. Mr Miller occupied the chair, and Mr Barton was croupier. After the usual loyal and patriotic toasts had been duly honoured,

The CHAIRMAN proposed the toast of the Royal Scottish Arboricultural Society. He welcomed them there on behalf of Lord Salisbury most heartily. He was in hopes that Lord Cranbourne would have been with them to preside at the luncheon, but unfortunately his Parliamentary duties—which now-a-days extended into the middle of August—compelled his Lordship to go to London by the next train. Lord Cranbourne had asked him to express his regret that he was unable to be present. He had said that he welcomed them most heartily to Hatfield; though he felt the Society had put them on their metal in coming to them after visiting the New Forest and the Royal domain of Windsor. But they had done their best to show them a small part of the estate, and he hoped that they should derive mutual benefit—the Society from seeing how an English nobleman's home woods and policies were managed, and the officials on the estate, from hearing the comments and fresh opinions expressed upon their work by the members of the Royal Scottish Arboricultural Society. He believed the Society was one of the most flourishing in the country; and he was also convinced that the good work it was doing north of the Tweed would aid them much here in the south. He hoped that in some future year they might meet again.

County Councillor BUCHANAN, Penicuik, in reply, said that their visit to Hatfield had very appropriately rounded off the Excursion of the Society to the South. They had learnt much from what they had seen since they crossed the Border last Monday, and they would carry back with them many useful ideas and pleasant recollections of their excursion to the South of England.

Mr DUNN proposed the toast of the Marquis of Salisbury. It was a toast, he said, which was welcomed by the English-speaking race all over the world; but standing as they did then in the noble domain of Hatfield, he was sure they would receive it with increased enthusiasm. They were under the deepest obligations to the Marquis of Salisbury for granting them the great privilege of seeing over his splendid domain, of viewing the historic old palace, the grand old trees, the ancient and most interesting vineyard, and the magnificent park; and not less for his hospitality in so kindly entertaining the Society, as he had done that day, to luncheon. In the name of the Society, he begged to return their thanks to the noble Marquis, and he asked them to toast his lordship's health with the utmost enthusiasm.

The call was most heartily responded to, cheers being also given for the Marchioness of Salisbury and for Lord and Lady Cranbourne.

Mr JAMES WATT, J.P., proposed the health of Mr Miller, remarking as he did so, that he was glad to see a Scotsman managing such a fine estate. But he knew that they recognised neither Scotsmen nor Englishmen as such at Hatfield, and that throughout all grades of the service upon the estate the utmost harmony reigned. In no other way could they have attained to such splendid results as they had seen that day.

Mr KAY, Rothesay, proposed the health of Mr Barton, and complimented the Marquis's chief forester on the admirable state in which all the woodlands were found.

Mr MILLER and Mr BARTON responded in a few appropriate words.

This being the last occasion on which the members would meet together in a collective capacity, Mr COLLINS, forester to the Duke of Sutherland at Trentham, Staffordshire, proposed a vote of thanks to Mr Dunn, Dalkeith, for all the trouble he had taken to make the Excursion a success.

Mr DUNN, in reply, said he was more than repaid if his exertions had in any way contributed to the success of the splendid Excursion which the Members of the Society had so much enjoyed.

After lunch, a visit was made to the Town-bottom Wood, where were several very fine elms, one of which, a noble tree, was 126 feet high, and 21 feet 4 inches in girth. It had a clean bole of 23 feet to the first branch, and it was estimated to contain about 900 cubic feet of timber. It was considered by many that this elm was the biggest tree of the kind they had ever seen. The "Elephant" Oak in this locality has a bole 26 feet in girth at 5 feet up, and there were many other old rugged oaks on this part of the grounds. One of these, a pollarded oak, measured 27 feet round at 3 feet up, and 29 feet at

5 feet. It was quite hollow in the centre up to 15 feet, and is well shown by the illustration on page 101, which represents this venerable oak.

The Gardens.

Under the guidance of the gardener, Mr George Norman, a visit was next paid to the beautiful Flower Gardens, laid out in the geometrical style of last century. A notable feature which attracted much admiration in those on the east and south fronts of the mansion, beside the well-filled beds of the gayest flowers, were

THE QUEEN'S OR PIAZZA GARDEN.

some admirably-trained standard heliotropes, of a light and dark colour alternately, which were set out in the parterres with excellent effect. The Maze—a favourite feature in a pleasure garden in the olden time—formed of close-clipped yew hedges, lies to the east of the Flower Gardens. The Mulberry, or "Queen's Garden," is on the west side of the house—a charming retreat, which is said to have been a great favourite with Queen Elizabeth. It is square in form, and has an arcade of lime trees running all round it—the trees being planted $3\frac{1}{2}$ yards apart, and so trained as to form a thick roof of

arching boughs, as shown in the illustration. On the lawn near each of the four corners is a mulberry tree. These are said to have been planted by James VI. of Scotland and First of England. On the day of our visit they were laden with a splendid crop of ripening fruit. In the centre of this shady garden is a rustic rock-work fountain; and in the wall at the west end of the north arcade is inserted a series of *bas reliefs*, which have a short history attached to them. The Mulberry Garden is a favourite resort of the present Marquis, who has a private passage leading from it to the mansion-house. The party proceeded along the pretty terrace to the conservatories and orchid house, which were full of fine plants, all in beautiful order.

In an interesting walk through the Pinetum, a number of splendid examples of Conifers were seen—*Cedrus Deodara*, *Abies grandis*, *A. nobilis*, *A. Morinda*, *A. Douglasii*, *A. cephalonica*, *Cryptomeria japonica*, *Sequoia sempervirens*, *Wellingtonia gigantea*, and others, being large and handsome specimens, and standing on a smoothly mown lawn, they were greatly admired. A very fine and well-furnished specimen of the Redwood, *Sequoia sempervirens*, 66 feet high, had a girth of 11 feet 7 inches at 5 feet up, and was considered by many to be among the finest trees of its kind in Britain. On the way to the Kitchen Garden a fine example of a larch, with a tall, straight, clean bole, was measured, and found to be 9 feet 6 inches in girth.

The Kitchen and Fruit Garden lies beyond the public road that skirts the west side of the pleasure grounds, at a short distance from the mansion-house. It extends to about 13 acres, heavily cropped with vegetables and fruit for the supply of a large establishment. Many of the fruit trees were literally borne to the ground by the weight of the loads they were carrying, the season being as favourable here as at other places we had visited for the production of fine fruit. A special feature which attracted much attention was the immense number of strawberry plants grown in pots for early forcing, in the cultivation of which Mr Norman is famed. A run through the extensive ranges of plant, fruit, and forcing houses, all full of well-grown plants or splendid crops of fruit, completed our inspection of this extensive and well-managed garden.

On the way to the station a peep was had into the parish church of Hatfield, a fine structure dedicated to St Etheldreda, where was seen a beautiful and elaborate marble monument to Sir Robert

Cecil, the first Earl of Salisbury, who, as Lord Burleigh, was the celebrated prime minister of Queen Elizabeth. Before parting, Mr Miller and Mr Barton were most cordially thanked for their kindness and courtesy in conducting the party over the estate, and in showing and explaining to them everything of note and interest that was met with in the course of the day.

Returning by railway from Hatfield to London, King's Cross Station was reached about half-past five o'clock, and there the Scottish contingent said good-bye to their English friends. Most of the Scottish members travelled north the same evening by the London and North-Western and Caledonian Railways, to the managers of which the Excursionists were greatly indebted for the admirable train arrangements made for their comfort.

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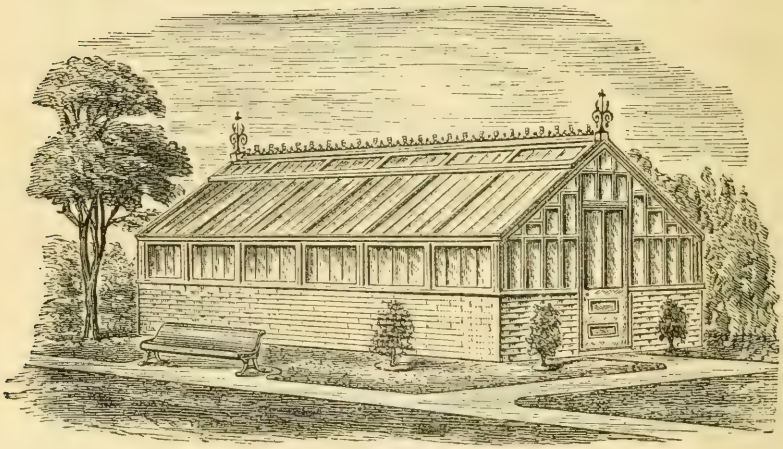

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TRANSACTIONS.

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TRANSACTIONS

OF THE

ROYAL SCOTTISH ARBORICULTURAL SOCIETY.

IV. *Address delivered at the Forty-first Annual Meeting, 6th August* 1894. By JOHN METHVEN, Vice-President of the Society.

GENTLEMEN,—In virtue of the honourable office I hold as senior Vice-President of the Society, I have been called upon, at short notice, to occupy this Chair and to address you to-day, in the unavoidable absence of the President, Mr Munro Ferguson of Raith and Novar, who greatly regrets that his official duties prevent him being with us on this occasion. It was only a few days ago that I received intimation that I might have to preside over this meeting, and deliver the Annual Address which you are accustomed to look for from the occupant of this Chair, and therefore I hope you will pardon me if I take up very little of your time in addressing to you the few short remarks I have to make on topics of interest to Foresters and Forestry.

At the risk of being accused of speaking from a selfish view of the question as an interested party, I do think the time is near at hand when the Government of this country must face the solving of the Forestry question from a national point of view, and devise some practicable scheme by which the waste lands of the country can be utilised to the best advantage, by planting of forests or otherwise. Government after Government, both Conservative and Liberal, have declared with the greatest frankness that "the Science of Forestry has been much neglected in this country." This remark I quote from the circular letter issued over ten years ago, by the late Earl Granville, to the representatives of foreign countries, and the British, Indian, and Colonial Governments, asking them to contribute specimens to the Forestry

Exhibition held in this city in 1884. Although various attempts have been made,—including a Parliamentary Committee which sat through at least three Sessions, taking evidence from experts, with the usual abortive result,—nothing of a useful and practicable nature, to improve our wastes and woodlands, has been evolved by the Government. True it is, that a comparatively small sum has been dealt out in driblets by the Government, in fostering the technical education of Foresters in a few select schools and universities; but nothing of any value is ever likely to result from such meagre attempts and half measures to instruct those interested in the fundamental principles of practical forestry, as applicable to the woods and plantations of Britain. The Government of India no doubt does educate and partially train the candidates for appointments in the Forest Service in India, at the Engineering College, Coopers Hill, near Windsor; but they are still sent abroad to acquire in foreign countries a practical training in the working and management of forests, and, so far, no provision whatever has been made by our home Government for the practical training of foresters for employment in any branch of the profession in Britain, India, or the Colonies. This is not as it should be, and certainly would be, if our Government performed the duties of the State in regard to Forestry in the business-like manner in which most civilised States have treated the question for many years. Why the British Government lags so far behind in the promotion of this most important branch of national industry, in which the prosperity of the empire is so vitally concerned, passes the comprehension of any observant and thoughtful man. It does not arise from lack of space and adequate material to work upon, as we know has been stated by those who were ignorant of the extent and capacity of our forests, or who from some less worthy cause decry British Forestry and all connected with it. Nor can it arise, in a wealthy State like our own, which justly boasts of being the richest in Christendom, from want of ample funds to carry out a reasonable scheme of Forestry education and training commensurate with the needs of the country and the public welfare.

As a matter of fact, students of practical forestry could not be better trained in the elements thereof in any country, than in that part of Scotland (Strathspey and Morayshire) which we shall have the privilege of visiting, and inspecting its forests, within the next few days. There you will find, and I desire it to be widely known,

not only natural forests of great extent, and worked on thorough business principles; but you will also see many thousands of acres of plantations adorning the rugged glens and steep hill-sides of "Caledonia stern and wild," formed and managed on purely commercial principles, which yield a substantial return for the labour and capital expended in their formation, on land which otherwise must have lain waste and almost worthless to the owners, as well as serving no useful public purpose.

An excessive denudation of forests has been going on, both by the forces of Nature and the hand of man, in many parts of the country for a considerable number of years, with little or no effort to restore the balance between woodland and treeless space. It is an open question, whether this denudation of forests has not an injurious effect on the climate of a country. On the low-lying seaboard this may be doubtful, but in upland and far inland districts, it is very possible; and notable instances are on record of the ruinous effects following in the wake of the clearance of forests from wide areas.

We will now turn to another aspect of the question, and ask,—What is to be done to make our waste lands more profitable to the owner and beneficial to the country? Plant them, we would reply, even although we are fully aware that it has been said "planting does not pay," and whatever does not pay, or give good promise of paying, is at once thrown aside in this utilitarian age. Still, it is a fact that many statistics of undoubted accuracy have been produced to show that planting does pay, when conducted with skill on suitable land, much of which could not be turned to any other purpose that would return one-fourth of the profits got from well-managed forests. Failures, no doubt, there have been in raising timber of sufficiently good quality to compete with foreign produce; but may not this have been the fault of the planter, rather than any drawback in the nature of the site, soil, or climate? I have often heard it stated by others than Scotsmen, that "trees won't grow in Scotland," meaning thereby not exactly that trees do not grow in our country, but that we cannot grow marketable timber in Scotland. As every member of this Society knows, this statement is a simple absurdity; but that timber of better quality, and consequently more value to the owner, could be grown in properly managed forests, skilfully formed, on much of the land now lying waste in this country, than is often met with in our woods, is a self-evident preposition.

Too often we find it to be the case, that sufficient attention has not been paid to the selection of the proper species of trees which suit the various soils and exposures. Larch and Scots pine are often mingled together, without any regard as to whether either of them are suitable for the soil in which they are expected to grow and thrive. It is seldom that the soil and other circumstances are equally suitable for both those useful trees, so diverse in their nature and wants; and here the knowledge of the properly educated and trained forester comes into play, with the most satisfactory results, in being able to decide before planting, which is the species of tree, or trees, most profitable to plant under ascertained conditions of soil and climate. Costly mistakes, which it takes a generation to rectify, are thus avoided, and the plantations will grow and thrive in a satisfactory manner throughout their life, in accordance with a well-devised scheme of management, carried out on strictly commercial principles.

Sir Henry Steuart, who published "The Planters' Guide" in 1828, begins his treatise by saying—"There is perhaps no epithet by which the inhabitants of the northern division of this Island in the present day can be more appropriately distinguished than that of a 'Planting Nation,' or to speak with more correctness a Nation of Planters. All men now plant trees who are possessed of landed property, from the wealthy citizen with his villa of an acre, to the powerful baron with his park of a thousand acres. The vast sums which are annually laid out on this useful and ornamental object, would exceed belief if fairly estimated. Yet of trees the Scottish landowner for the most part knows little, although he may possibly know as much as his English neighbours. But like them he lays out his money freely on the work, however executed, conceiving, and with justice, that he has done a great thing, if not for himself at least for posterity."

So wrote Sir Henry Steuart at the beginning of this century, and now, towards its close, we are meeting and endeavouring to carry out his ideas as a Society for the improvement of Arboriculture. I think we may fairly ask ourselves the question—Are we doing all we can for its improvement? Certainly, during the last ten years we have done wonders. The Forestry Exhibition, one of the most complete and instructive of modern times, was originated by and carried out under the auspices of this Society; we have offered prizes for, and published many valuable essays on Forestry subjects. There is one thing I

would suggest, and I think it is possible for the Society to carry it out, that we should have fixed quarterly meetings, at which papers might be read on matters connected with lands, more especially in relation to forestry, and followed by a free discussion on the points raised in the papers. By this means a friendly interchange of our views, on many matters of the greatest importance to forestry, would receive more thorough sifting and careful attention than they have hitherto got from this or any other Society.

I have already touched upon the necessity for a Forestry School, and I would now like to tell, in a few words, what other countries are doing for Forestry education. In France and Austria there are first-class Forest Schools, supported by the State. In the seven principal States forming the German empire, there are nine Higher-Class Schools, and numerous Secondary Schools, employing fifty-two professors and eleven assistants. Italy, Switzerland, and Spain have all Forest Schools. Sweden is just starting one. In India, there is the Dehra Dun Forest School, established sixteen years ago. In fact, all civilised countries, including Japan, have thoroughly efficient Forest Schools.

The nature of the instruction given at these institutions is varied and complete. Take the Forest School at Nancy, France, for instance. Each year of study at the School comprises six and a half months of theoretical, and two and a half months of practical instruction; one month is occupied by examinations, and there are two months of vacation. During the period devoted to theoretical instruction, the following subjects are taught, viz., First year—Sylviculture in all its branches; botany, including vegetable anatomy and physiology, as well as the classification of plants, and their geographical distribution, special attention being paid to forest trees and shrubs; political economy, with special reference to forest statistics; law, including forest laws and rules, together with such general knowledge of the common law of the country as is judged necessary; surveying and the construction of roads; the German language; military science; riding. Second year—Working plans or schemes of forest management; mineralogy and geology, with special reference to the chemical and physical properties of forest soils; zoology, especially that branch of it relating to the insects which attack trees; agriculture; buildings, including houses, saw-mills, and bridges; the treatment of torrent beds, including

the construction of masonry and other weirs. The teaching of surveying, law, the German language, military science, and riding is continued. During the last month of each theoretical course, weekly excursions are made into the forest; but with the exception of these and the riding drill, the whole of the instruction is given in the class-rooms.

The practical course, which occupies two and a half months of each year, or five months in all, consists of tours made into the forests in the neighbourhood of Nancy, as well as into those of the Vosges and Jura mountains, and occasionally to other localities, for the purpose of studying forestry, natural history, and surveying; but a part of the time is devoted to military exercises. An area of 7500 acres of forest, situated near Nancy, and placed under the Director of the School, is used as a field of practical instruction, as well as for various experiments and researches, to carry out which an Assistant Inspector is attached to the staff. The subjects dealt with by him are, principally, meteorology, the growing of plants in nurseries, various methods of pruning, the effects of different systems of thinning, the rate of growth of various kinds of trees living under different conditions, and many other things connected with the science and art of forestry. For this information about the course of training and education in force at Nancy, I am indebted to Colonel Bailey's interesting pamphlet on the "Forest Schools of Europe."

I have now said enough, I think, to show you that we are very far behind other civilised countries in the provision they have made for the thorough education and training of their Foresters. This should stimulate us the more in going forward to urge upon the Government of the country the pressing need for the question being taken up and dealt with in such a thorough manner, as to bring us at least into line with foreign countries in all matters concerning the science and practice of Forestry.

V. *Forestry in Britain: An Address to the Biological Section of the British Association, delivered at the Oxford Meeting*, 1894. By Professor I. Bayley Balfour, M.A., M.D., F.R.S., President of the Section.

After referring to the death of Dr Romanes, and to the constitution of the Biological Section, Professor Balfour said,—

In selecting the special topic upon which I am to address you, I have followed the lead of those of my predecessors in this chair who have used the opportunity to discuss a practical subject. Forestry, about which I purpose to speak, is a branch of applied science to which, in this country, but little attention has been given by any class of the community. By scientific men it has been practically ignored. Yet it is a division of Rural Economy which ought to be the basis of a large national industry.

There are no intrinsic circumstances in the country to prevent our growing trees as a profitable crop for timber as well as our neighbours. On the contrary, Great Britain is specially well adapted for tree-growing. We have woodlands of fine trees, grown after traditional methods, abundant in many districts. The beauty of an English landscape lies in its trees and its pastures. Nowhere in the world, probably, are to be found finer specimens of tree-growth. As arboriculturists we are unrivalled. But the growing of trees for effect and in plantations is a very different matter from their cultivation on scientific principles, for the purpose of yielding profitable crops. This is sylviculture. The guiding lines of the two methods of culture are by no means the same—nay, they may be opposed; and it is the sylvicultural aspect of the science of forestry which has hitherto been neglected in this country. The recognition of this is no new thing. But within recent years it has attracted considerable public attention, as the importance of wood cultivation in our national life has been more realised; and although various proposals have been put forward, and some little effort made for the purpose of remedying the admittedly unsatisfactory state of forestry practice, there has been so far no great result. I attribute this in great measure to the apathy of scientific men, especially botanists, and I am convinced that until they devote attention to forestry, the great issues involved in it will not be rightly appreciated in this country.

It is not the first time the subject has been before this Section. I find that in 1885, at the Aberdeen meeting, a committee was

appointed by it to consider "whether the condition of our forests and woodlands might not be improved by the establishment of a forest-school." The good intention of the promoters was not fulfilled, however. The committee did not meet.

In the first instance, let me briefly refer to the national economic features of forests as they affect us.

There are two aspects from which forests are of importance to a country—firstly, as a source of timber and fuel; secondly, on account of their hygienic and climatic influences.

With regard to the latter, it is a popular notion that trees exercise considerable influence upon atmospheric conditions, but it is only within recent years, and as the result of long experimental research in Switzerland, France, Austria, Germany, and other areas where forestry is practised at a high level of excellence, and also in the United States, that any sufficient data have been forthcoming to form a basis of scientific conclusion upon so important a matter. Although many points are still far from clear, the evidence goes to show that the direct influence of tree-growth upon climate is no mere superstition. Stated in the most general terms, it is proved that forests improve the soil drainage, and thereby modify miasmatic conditions; whilst, like all green plants, trees exercise, through the process of carbon-assimilation, a purifying effect upon the air,—the existence of the increased quantity of ozone often claimed for the vicinity of forests is not yet established; by opposing obstacles to air currents, forests prevent the dissemination of dust particles with their contingent germs; they reduce the extremes of temperature of the air; they increase the relative humidity of the air and the precipitation in rainfall; and they protect and control the waterflow from the soil.

To us these effects do not appeal with the same force that they do in Continental areas. Our insular and geographical position renders us in a measure independent of them. The data for these Continental results, it must be remembered, are derived from large forest areas such as do not exist here. For this country I know of no experimental evidence on the subject. As, however, the effects of forest influence are felt mainly in local modifications of climatic conditions, we are not justified in regarding the conclusions that have been reached as inapplicable to Britain. No little interest attaches, therefore, to a statement based upon these Continental observations to which Dr Nisbet has recently done well to call attention—that "where the rainfall is over forty inches it is

undesirable to increase the forest area." The significance of this dictum, if it be established, to Britain, dependent so largely upon her agriculture, is evident. Wet years, unfavourable to farm crops, are, under existing conditions, more numerous than favourable dry ones, and any extensive tree-planting in agricultural areas might therefore prove disastrous. But I may here emphasise the point that, whilst for the growing of specimen trees we may agree with Evelyn when he says, "If I were to make choice of the place or the tree, it should be such as grows in the best cow-pasture, or upland meadow, where the mould is rich and sweet," yet, the harvest which scientific sylviculture reaps comes from land unsuited to agriculture, which would otherwise lie barren and waste, and therefore schemes for the afforestation of such areas in non-agricultural districts need not be prejudiced by the prospect of an increased local rainfall. At the same time we must not fail to learn the obvious lesson that afforestation is not, as some suppose, a simple matter of employment of labour, but that it involves the consideration of weighty scientific problems.

Forests, as a source of fuel, have not the direct importance to this country, rich as it is in coal-supply, that they have in States less favoured, but their economic importance to us as a source of timber needs no comment. There are no means available through which to estimate the annual output of timber from our plantations, but indirectly we can gauge the insufficiency of our woodlands to supply the timber necessities of the country by reference to the returns showing the amount and value of forest produce annually imported. This has been steadily increasing, until in 1893 its value exceeded eighteen million sterling. Of course a considerable proportion of the materials thus imported could not in any circumstances be produced in Britain. But, after allowing a liberal discount for these, there remains a large bill which we pay for produce, no small portion of which could be furnished at home. No one would suggest that in the limited and densely populated area of Great Britain timber-trees of kinds suiting our climate could be grown sufficient to supply all our demands; that would be impossible. But few would venture to deny that we could do very much better for ourselves than we do, and that our payments abroad might be materially reduced. It is admitted that well-grown home timber is, of its kind, equal, if not superior in quality, to that which is imported; it is surely, then, legitimate to expect that a large supply of well-grown timber would enable us to hold

the market to a much larger extent than is presently the case, and that we might be very much less dependent than we are upon the surplus timber of other nations.

The importance of this to the country is increased by the consideration of the continued appreciation of timber. There is abundant evidence forthcoming to indicate that the present rate of timber consumption of the world is in excess of the present reproduction in the forests of the great timber supplying countries, and with the persistence of existing conditions we would appear to be within measurable distance of a timber famine. Experience, too, teaches that we may expect not a diminution but rather an increase in consumption. No doubt as civilisation advances the discoveries of science will, as they have done in the past, enable us to substitute in many ways for the naturally produced wood other substances prepared by manufacture; but this saving in some directions has been, and will probably continue to be, counterbalanced by greater utilisation in others—witness, for example, the enormous development within recent years of the wood-pulp industry abroad, and consider the prospect opened up by the manufacture of wood-silk which is now being begun in Britain.

That the possibility of forest exhaustion is no chimera should be evident to anyone conversant with current timber literature. Taking North Europe for instance:—In Norway, "raw timber is yearly becoming more expensive and more difficult to obtain." To Sweden "pitch pine long beams are taken from America, suitable ones of sufficient size and quality being unobtainable now in Sweden." In Scandinavia, the virgin forests, "excepting such as are specially reserved by the Government in the districts where mills are situated, are almost exhausted." In Russia, the Riga "supply of oak is exhausted." These sentences, culled within the past few weeks from trade journals, show that this is a more pertinent question than some would suppose. In Sweden, which, it is remarkable, is actually importing logs from America, the situation is regarded as so serious that proposals are on foot for the imposition of a tax upon exported timber for the purpose of raising a fund for replanting denuded areas. But it is not only in North European countries that there are signs of the giving out of timber forests. As they fail, the demand upon Canadian and American stocks increases, and when we look at these, Canada "shows signs of beginning to find it hard to continue her voluminous exports to Europe, and at the same time send sufficient supplies to the United

States." But the most striking evidence is that furnished by the chief of the United States department of forestry, in his official report for the year 1892, in which he says: "While there are still enormous quantities of virgin timber standing, the supply is not inexhaustible. Even were we to assume on every acre a stand of 10,000 feet B.M. of saw timber—a most extravagant average—we would, with our present consumption, have hardly one hundred years of supply in sight, the time it takes to grow a tree to a satisfactory log size. Certain kinds of supplies are beginning to give out. Even the white pine resources, which a few years ago seemed so great that to attempt an accurate estimate of them was deemed too difficult an undertaking, have, since then, become reduced to such small proportions that the end of the whole supply in both Canada and the United States is now plainly in view."

It must be owned that there are those who do not regard the suggestion of forest exhaustion as a serious one. They argue that the prophecy is no new one, and yet we are none the worse off than we have been; that, failing supply from one source, it has always been possible to tap another, and so it will probably continue; and then the period when exhaustion is likely to take place is so far off, there is ample time for the growth of new forests to replace those being cut. No doubt there is time. But this is just the kernel of the whole forestry question. With proper conservancy of forest areas, the application of scientific principles to the recuperation of areas recklessly denuded, and the afforestation of barren and waste lands, timber sufficient to meet a greater demand than is now made could be produced. This is the aim of scientific forestry, and it is to secure this that those who have given attention to the subject are working, conceiving it to be a duty of this generation to hand down to its successors a heritage no less valuable than that which it received.

With an acreage of wooded land amounting to only 4 per cent. of their total area, Great Britain and Ireland possess a smaller proportion so covered than any other European country. Denmark comes near with only about 5 per cent., in France the percentage rises to 15, in Norway and Germany to 25, in Austria-Hungary to 30, whilst in Sweden the amount is over 40 per cent. The United States is estimated to have about 25 per cent. These figures do not, however, give a fair basis of comparison of the amount of timber area in Great Britain with other countries, inasmuch as in the Continental lands the bulk of the woodlands is

true forest, whilst a large part of the area included in the British return is merely pleasure ground, and another large portion is only plantation; of real forest the area is extremely limited. It is not surprising, then, that we are not able to furnish ourselves with an adequate supply of timber. But although there is so little land under wood, there are thousands of acres unsuited for any other crop, and these, for reasons I have already indicated, it is desirable to have planted. How to have this accomplished, and how to secure that woodlands already existing shall be tended so as to produce a maximum result, giving a profitable return, are the problems we wish to see solved.

It will conduce to appreciation of the question if I briefly discuss the causes which have been active in developing the present condition of woodlands in Britain, and in bringing about the disparity between it and other countries in respect of woodland area.

State ownership of Continental forests will probably occur to most people as the reason for the difference in area just pointed out. This is true, with, however, some qualification. In consequence of the circumstances of their situation, Continental States have been compelled to recognise the national economic importance of forests. This they have done, not so much by the creation of State ownership in vast forests as by the organisation of a State department of forestry and a State system of forestry education. It is altogether a mistake to suppose, as is often the case, that the whole or even a large part of the forests on the Continent belong to the respective States. The amount of State-owned forest is surprisingly small. Fernow gives it in Germany as about 33 per cent. of the whole forest area; in Scandinavia 15 to 20 per cent., in France some 10 per cent., in Switzerland 4 per cent., whilst in Italy it is not 2 per cent. The bulk of the forest is in the hands of private owners or corporate bodies, subject, though apparently not always, to some control or limitation by the State. But the example of the States in the management of their own woods, their readiness to give advice through their officials, and the education which is carefully provided for those concerned in forestry work, have resulted in those privately-owned forests being as well managed as those of the State. It is important to make clear this distinction, because it shows that a State system of conservancy and supervision of forestry is quite compatible with large private ownership in forests, and that efficient sylviculture upon a large scale is not inseparable from State ownership.

But some one may say, "We, too, have State forests!" Yes, but it is almost absurd to mention them in the same sentence with those of the Continent for any part they play at present in connection with forestry in Britain. The nine thousand acres at Windsor are mainly covered with specimen trees. Of the twenty-five thousand acres in the Forest of Dean, a portion is supposed to be cultivated for a profitable crop, but appears to result in an annual deficit. The New Forest, with its sixty-three thousand acres of soil-area, affords us one of the most interesting object-lessons, showing the triumph of sentiment over common-sense, that the country affords. Its history is well enough known, and I need only remind you that Parliament has decreed the major part of it to persist as a barren waste, whilst in the remainder which is covered with trees the practice of forestry is prohibited, so that slowly the whole is going to wreck and ruin. This illustrates the value to us of State forests! In the days of the "wooden walls" the dockyards obtained valuable timber from them, but now their large area is, one may say, of no State service whatever as forest, if one excepts a small portion of Windsor Forest recently attached for instruction purposes to Coopers Hill College. There can be no question that if the State had set an example of scientific forestry in even a portion of these areas, the practice of sylviculture now throughout the country would have been very different.

I need not dwell on the fact that the conditions of land tenure in the country have exercised an important influence upon the extent of wood-planting in the country; and they must always do so. "The oak scorns to grow except on free land," is a saw that sums up pithily the relationship between land-laws and woodlands in England. Copyholders could hardly be expected to plant much timber when the lord of the manor claimed the crop; and I believe it is possible in some counties to trace the boundaries of copyholds by the entire absence of trees on one side of a line and their luxuriant growth on the opposite side. The intricacies of entail, and the fact that liferenters had themselves to bear the expense of planting, except where necessary for shelter, without prospect of seeing a return for the outlay, must have operated prejudicially to an increase in woodlands. Happily since 1882 in England, and by an act of last year for Scotland, the last-mentioned restriction upon tree-planting is removed.

Nor shall I pause over the question of game, which has been at

once the origin and the destruction of forests in Britain. Not that it is an unimportant element. But the instinctive love of sport in the British race is proof against all argument of utility, and the needs of sport will always be a barrier, as they have been in the past, to the planting of large areas well adapted for timber-growing. It cannot well be otherwise. Landowners can hardly be expected to forego large and immediate game-rents for what appear the long-delayed, even though possibly greater, profits of timber-cultivation. In this case the inevitable must be accepted. Nevertheless, there are large areas, the game-rent of which is infinitesimal for their acreage, which might be planted.

The most potent factors in bringing about the present condition of our woodlands are probably to be looked for in the nature of the crop itself, and in the want of appreciation of its character manifested by landowners; in a word, in a want of knowledge of the principles of scientific forestry. Forestry is handicapped as compared with agriculture by the fact that the crop cannot be reaped within the year. The owner who plants and incurs the initial expense of stock, fencing, and perhaps draining, may after some years secure intermediate return from thinnings, but it will rarely happen that he reaps the final yield at maturity of the crop he has sown; it will fall to his successor. It is this planting for posterity that makes demands upon the landowner to which he is unequal. Hence it comes about that woodlands, beyond what may be requisite in the way of cover plantation and for shelter, are often regarded as expensive luxuries, and, in the time of high agricultural values, landowners have even grubbed out trees to make way for annual crops yielding an immediate return. But scientific tree-growing for profit does not consist in the covering of soil-area indiscriminately with trees, without definite system and relation of its parts one to the other. Just as the farmer has to plan his rotations on a definite system with reference to his total acreage, so in properly managed timber-growing must areas be arranged in such a way that some part of the forest will be yielding annually its final return of mature crop, and cleared areas will by a natural process of regeneration replenish themselves without recourse to the expensive operation of planting being necessary. Scientifically worked, a forest area on suitable land, of which there is such abundance in Britain, should be capable of yielding an annual net revenue as regular as that obtainable by any other form of soil cultivation.

It is nevertheless frequently urged as a reason for not growing timber, that wood will not pay in Britain. A landowner will tell you he has acres of land which do not return him more than half-a-crown, and if it would pay better he would be glad to put them under timber, but he does not believe it would; and he will point to rates on woodlands which must be paid although no crop is being reaped. He will demonstrate that there is no market for home timber, which seldom fetches its value, and that there is a prejudice against it which increases the difficulty of any attempt to compete with the foreigner.

There is some reason in the latter part of this contention. The wood-grower in Britain has, I think, just cause for complaint when he finds his produce not only handicapped by preferential transport rates to foreign timber, as has been the case in the past, but that it is also disparaged by exclusion from, or admission only under stringent conditions to, competition with foreign timber by the terms of building specifications. It is said to be the common practice of architects and others to debar the use of home timber in this way, and the Government itself has not been guiltless in the matter. The Post Office form of tender a couple of years ago for telegraph-poles entirely cut out native produce from competition, and the conditions of contract framed by the Board of Agriculture under the Land Improvements Act were until recently almost prohibitive to home timber. These latter are now modified, but whether or not the Post Office still boycotts home produce I cannot say.

However it has come about—and there are no doubt various effective causes—this undervaluing of home-grown timber is quite unreasonable, and the slur cast upon it is undeserved, so far as its quality is concerned. At the same time, there is ground for saying that the difficulties occasioned in this and other ways, of disposing of home timber at remunerative prices, are due to causes not altogether beyond the control of landowners who grow timber.

It is generally admitted that with a more regular and certain supply, as well as a larger amount in different districts, home timber would have a better chance of holding its own in the market. This is just what scientific forestry would bring about. Given a systematic cultivation of forest on scientific principles of rotation, and the conditions are prepared for a steady output of timber by annual cut, as well as for a supply of raw material for utilisation in the manufacture of the many subsidiary products derivable from forest growth. If landowners would only provide such supplies,

they would alter altogether, and to their own advantage, the conditions under which they dispose of so much of their home wood. The timber merchant who now travels hither and thither over the country picking up small lots where he can find them for transport to his, probably distant, mills, at a cost which eats a big hole in the value of the trees to the landowner, would find it worth his while—and, for that matter, it would be worth while for the landowner himself—to erect, in the vicinity of the forest, mills for the purpose of converting and preparing the timber, and to put up machinery for the extraction of useful products from the waste wood. In such conditions a steady market could be created, in which the advantage would lie altogether on the side of the home-grown article, and materials, the débris of the forest, now thrown aside as useless, would be turned to account, to the greater benefit of the landowner. Encouragement, too, would be given to the establishment of local industries dependent upon forest growth, through which fresh outlets for forest produce would be provided.

The amount of profit returnable from timber cultivation must, of course, vary with the circumstances of the area in each case, but in comparing values it must always be borne in mind that timber land is land which can yield no agricultural rent. The official statistics relating to Continental State forests show us the result of forestry on a large scale, and it is interesting to note how, under what we must believe to be an equally efficient system of forestry management, the net revenue from the several areas differs greatly. Thus from its two million acres of forest area Bavaria draws a little over five shillings per acre per annum; Wurtemburg, with nearly half a million acres, gets a return of about eleven shillings; and Saxony, with a somewhat less area, receives over seventeen shillings per acre per annum. For this country we have no such figures. Our State forests result in a loss. It is unfortunate, too, that no returns are available from private forests and woodlands, either in Britain or abroad. Estimates of possible profits in this country we have abundantly, but solid figures of expenditure and receipt in relation to timber-growing there are none. By the favour of Mr Munro Ferguson, M.P., who, as a landowner, exhibits a most enlightened spirit in regard to forestry, I am, however, able to cite the case of a pine and larch wood at Novar, in Ross-shire, twenty-four acres in extent, which was clean cut in 1883, and gives instructive figures. After sixty-one years' growth on land similar to that which in the neighbourhood yields a grazing rent of from

one to two shillings per acre, it is found to have yielded a net sum equal to a revenue to the landlord during the whole period of its growth of over nine shillings per acre per annum, or an increased value of quite seven shillings per acre per annum. Although it refers to only a single wood of limited extent, this return shows how profitable waste land may become under timber. No doubt from the estates of others of our landlords who own extensive woodlands, where, if there is not the highest scientific forestry, there is certainly good wood management, results of an equally instructive kind could be obtained—many would be better; and it is much to be desired, in the interest of forestry, that they should be made known, as an object-lesson to those who doubt the profit of tree-growing.

But in the return I quote from, there is another interesting point which I must not fail to note. During the period of growth of the wood, the outlay upon labour in connection with it amounted to a sum equal to an expenditure of over thirty-one shillings per acre per annum. That is to say, this sum was distributed in wages to the people of the neighbourhood. This exhibits the benefits brought in the train of forestry, which are no less important to the community at large than is the profit of the crop to the landowner. The scientific treatment of woodlands, and cultivation of forests for profit on a proper scale, involve the employment of a considerable amount of labour, much of it at a time when there is little else doing in country districts, not only in the actual tending of the forest area, but in the manipulation and subsequent preparation of the timber, and in the manufacture of the numerous by-products obtainable from it. In these days of congestion in cities, the importance of the development of such an industry, which can provide occupation in the country, and thus may aid in restraining migration to the towns, has not escaped notice, and it cannot be too often or too greatly emphasised.

The influences, to which we have just given attention, that have prevailed in bringing about the present limited area of woodland in Britain are, it will be seen, not wholly irremovable, nor are the obstacles to betterment insurmountable. And the question we have now to discuss is—How are these to be counteracted and overcome? By what means is it possible to bring forestry in Britain more in line with that of other nations? At the outset I would say that if forestry is to be established on a sound commercial basis, the only one on which it should rest, if we are to

have a national home-timber industry, it can only be when the issues involved are more fully realised than they are nowadays. As in agricultural practice failure can only be obviated by the application of scientific methods in farm cultivation, so is it with forestry. To become a profitable industry it must be practised as an applied science, and not as an empirical routine.

We live beyond the days when it would be possible to apply the autocratic remedy for want of woodlands introduced in Scotland by the Jacobean statute, which compelled the landlords not only to plant wood and forest and make hedges, but also enjoined them, under penalties, to see that each of the tenants planted one tree for every merke of land. Nor, indeed, can much be said of the success of the compulsion. And I do not imagine anything could be gained nowadays by the method adopted in Scotland in the middle of last century by the "Select Society," as it was called, of offering a premium to farmers who planted the most trees within a specified time. That such processes were deemed necessary is interesting as showing how old standing has been the recognition of the want of sufficient woodland area in the country. At the present time there are those who would reverse, as it were, the process of the old statute, and who look to the acquisition by the State of large areas of waste land, and their afforestation by it, for the solution of this forestry question. It is, no doubt, a wise policy which encourages private enterprise to deal with the details of industries, and only invokes State aid as a directive and controlling force when its need can be clearly shown. That there is need for State aid in the case of forestry I do not deny, but it is not required to the extent just mentioned.

I unhesitatingly say that the State ought to treat the forest areas now in its possession in a reasonable and scientific manner, instead of leaving them as objects for the finger of scientific scorn. They might be made, in part at least, models of the best forestry practice. It is no use to dispute with the sentiment and taste which have prevailed in making the New Forest what it now is, and it is hopeless to expect an unanimous verdict as to the destiny of State woods and upon the method of treatment to which they should be subject. We have had recently, in the lively discussion regarding the management of Epping Forest, an illustration of how large is the number of people who have views upon the subject of the management of woodlands, and how the majority of them, if they had their way, would, through ignorance, defeat the very object they desire

to accomplish. We must be prepared, in any proposal for utilisation of State forests, to incur the opposition of those who regard all scientific handling of woods as vandalism, although I do not know that forestry in itself involves a want of recognition of the beautiful, or dulls the feelings which a sylvan landscape invokes in the minds of those in touch with nature. It is allowed there are areas in our State forests sacred by many memories, possessing a grandeur and picturesqueness with which no hand, whether of forester or landscapist, would venture to meddle. But, on the other hand, there are tracts which, without damage to the natural beauty, and without depriving in any sensible degree the people of their privileges of recreation they prize so much, might be and should be dealt with as forest cultivated on scientific principles. These might serve as instruction areas, showing all that is best for the information of foresters. The creation of some such experimental teaching stations in State forests is one of the essentials for forestry in Britain. I would go further, and say that the area of State ownership should be increased to the extent of the establishment of forest stations, of an acreage sufficient to allow of a satisfactory rotation, in other parts of the country as centres of instruction. There have been, as you are aware, proposals for the afforestation of some of the three million and more acres of waste land in the Highlands of Scotland capable of growing timber, and we await with some interest the report of the Deer Forest Commission, which has taken evidence on the subject. If, as has been suggested may be possible, afforestation is attempted through any system of State-aided planting, an opportunity would be afforded for securing what would be of so much advantage to the country. Beyond this system of model experimental stations, the State ownership of forest in Britain does not seem to me to be necessary in the cause of forestry.

Replying recently to Sir John Lubbock in the House of Commons, the President of the Board of Agriculture, after recounting what his Board is now doing for forestry in Britain, added: "I shall always be glad to receive and to consider any suggestion for the increase of sound technical knowledge on this subject." Well, now, I have a suggestion to make. In a practical science like forestry, "an increase of sound technical knowledge" can only be possible when facilities for practical instruction are provided. I would, therefore, ask the President to consider what I have just said with regard to State forest experimental areas. These cannot,

of course, be created by a stroke of the pen, but the initiative for their formation would naturally come from the Board of Agriculture. It is possible that, with betterment in forestry practice, landowners might be found who would be willing to devote portions of their land for the purposes of instruction, following for forestry the noble example of Sir John Lawes in his work for agriculture; and everyone interested in forestry must hope this may be so. But when the State has already in its hands the means through which a large national industry can be fostered, it is surely incumbent on it to utilise them for the purpose. And mark you, in asking for this, one does not make a large demand upon the Treasury. The whole could be done at no ultimate cost, for the profits from the areas would unquestionably more than repay any outlay incurred upon them.

The true solution of the forestry question in Britain is to be found in the diffusion of accurate knowledge of forest science. The landowner has to be convinced that through scientific forestry a sound and profitable investment for his capital is to be found in woodlands; the factor or land agent must be instructed in the scientific principles of tree-growing for profit, to enable him to secure a steady income to the landowner from his invested capital; and the working forester has to be taught methods of cultivation based upon science, by which his faith in traditional practice, when it is, as is so often the case, unscientific, may be dispelled. It is through education alone that we can arrive at improved forestry.

This was recognised by the Select Committee upon Forestry of the House of Commons in its report in 1887, which performed a very valuable service by its exposure of the prevalent ignorance of scientific forestry and of well-known facts of tree-cultivation amongst those professedly engaged in its practice and study—an ignorance the continued existence of which manifests itself in some of the writings in current periodicals. The remedy it suggested of a State Forest Board, including representatives of science and of bodies interested in forestry, charged with the superintendence of the formation of forest schools and the preparation of forest literature, was superseded by the later institution of the Board of Agriculture, in which were absorbed such functions in regard to forestry as the Government of the day accepted. We are so accustomed to anomalies in our administrative system, that the discovery of an additional one hardly surprises us. Yet it is difficult to understand why it is that a Board which deals with

subjects so essentially based on science as does the Board of Agriculture, should not have on its staff scientific men representative of the fields of science within its purview. But I do not know that either agriculture or forestry is so represented. It seems odd that this Board should be dependent for scientific advice upon outsiders; and now that it proposes to undertake the responsibility of the publication of a journal which, I take it, will be a means for the circulation of accurate information upon scientific questions, I do not see how its functions can be adequately performed without scientific help from within. No one of us would expect to see, either to-day or to-morrow, in this country a Board of Agriculture with an organisation like that of the similar department in the United States, which excites our admiration by the excellence of the practical information it circulates. But there is a wide interval between the completeness of the American department and the incompleteness of ours; and if I may make another suggestion to the President of the Board of Agriculture, I would ask him to consider whether it would not strengthen the Board in the discharge of its rapidly growing functions if it had competent scientific advisers upon its staff. Such a man for forestry would, I believe, do much for "the increase of sound technical knowledge" in Britain, and promote to no little extent its interests.

Since 1887 we have made some advance along the lines of improved literature and of teaching pointed out by the Select Committee as those by which reform could be accomplished.

If one looks at the literature available up to a recent period to anyone desirous of learning something about forestry, one need feel little surprise at the ignorance which prevailed. It was alike meagre in amount and deficient in quality, consisting chiefly of the records of empirical practice of men who had had no scientific training. It is satisfactory to note that these are now being replaced by works having some pretension to scientific method and accuracy. From Coopers Hill there is issuing, more slowly than could be wished, Professor Schlich's excellent "Manual of Forestry," and from his colleague Professor Fisher we may, I believe, soon expect an important forestry book. You all know Professor Marshall Ward's lucid little books on timber and plant-diseases, and we are promised immediately, under his editorship, a translation of Hartig's "Diseases of Trees," by Professor Somerville. A most valuable and interesting contribution to forestry literature is the book by Dr Nisbet, recently issued from the Clarendon Press,

containing the lectures he delivered in the University of Oxford during the past year; and to his marvellous energy we shall owe the new edition of "Brown's Forester," which is shortly to appear, and an English version of Hartig's "Text-Book" for foresters. All this activity shows an increasing interest in forestry, but it is only the beginning of a movement to make up for the preceding dearth. Botanists are greatly indebted to the Delegates of the Clarendon Press—and it is fitting I should here acknowledge the obligation—for the splendid series of standard foreign works on botany they have brought within the reach of English-speaking students, and which have done so much for the progress of botany in Britain. If we have now got beyond the stage of dependence in pure botany, we are far from it in scientific forestry, and I would hope that the Clarendon Press will add to its botanical series some of the standard foreign forestry books, and thus aid in the dissemination of the knowledge so essential to progress in the subject.

I must not omit to refer here to the excellent opportunity that is afforded for the circulation of scientific information by the new journal of the Board of Agriculture, of which intimation has recently been made, and it is to be hoped that forestry will find a place in it side by side with agriculture.

The attention paid to the teaching and study of forestry by Continental States, their many schools and copious literature of forestry, make it remarkable that, apart altogether from the economic side, forestry as a subject of study and investigation has not been long ago introduced in some of our teaching centres. I think the Sibthorpian Chair of Rural Economy of the University of Oxford was for long the only one through which forestry was recognised as within the sphere of university education. So far the limited tenure of this chair, in its new dress, has been held by agriculturists—in their line the most distinguished men; but I should like to think that one may look forward to a time when forestry shall have its turn, if by that time it has not come about that it is otherwise provided for.

It was, however, only the necessities of India which, at a comparatively recent date, led to the first starting of forestry teaching in Britain, and then only at the cost of India, and for those destined to serve there as foresters. Coopers Hill College, the outcome of these, with its excellent equipment—including now, I believe, a slice of Windsor Forest for purposes of practical work—possesses the elements of a successful forestry school, and it has

within recent years opened its doors to outsiders who may wish to learn forestry. But, so far as I am aware, it does not draw the young landowners of the country as it should do. Possibly the expense of the special education, which equals that of the universities without offering the advantages in other directions they afford, may be deterrent; but I am inclined to think that if the authorities made the fact better known that men other than foresters for India are admitted to the College, more would avail themselves of the opportunity.

Beyond this, and some slight notice of forestry at agricultural colleges, there have been no facilities for forestry teaching in Britain until within the last half-dozen years. I leave out of reckoning mere examining boards. Can we wonder, then, that there is a general want of intelligent appreciation of scientific forestry? Even now all that has resulted from the agitation in favour of more attention being given to this subject is—a lectureship on forestry in the University of Edinburgh, supported partly by the Board of Agriculture and partly by an endowment from subscriptions among landowners and others (and, I may mention here, forestry is now included as an optional subject in the university curriculum for an agricultural degree); a chair, or part of one, in the Royal College of Science at Newcastle, founded conjointly by the Board of Agriculture and the County Council; a course of instruction in science for practical foresters in the Royal Botanic Garden at Edinburgh, maintained by the Board of Agriculture; and a lecture course on forestry in the Glasgow and West of Scotland Technical Institute, similarly provided for. I must not omit to mention, too, the beginning, just made, by the Surveyors' Institute of the formation of a forestry museum in London, which should have an important educative influence. Little though it is, I think there is occasion for congratulation that even so much has been done to provide instruction, and I would have you note that in this education the different classes concerned with forestry are all recognised. Valuable as the teaching so being given is, it must have an effect in showing the need there is for more. In one way the teaching of all these bodies is incomplete, and must be imperfect, inasmuch as they have not the means for practical forestry work. Until this is provided, as I have indicated already, the teaching of forestry cannot be thoroughly carried out.

But, after all, what has been done in the way of supplying our wants in the way of teaching is nothing to what is required if

forestry is to be adequately taught in Britain. Dr Nisbet, who, in his book already mentioned, has had the last say on this question, boldly states the requirements at six forestry chairs in universities, and four schools of practical sylviculture in the vicinity of forests. I do not think he put the needs one whit too high. I should be even disposed to add to them, because I note he has omitted to take into account the claim of Wales, whence there has recently been a request for the establishment of forestry teaching.

But there are two questions strictly pertinent to this demand, which need answering if the proposals are to be brought within the sphere of practicability—firstly, whence are the funds to be obtained for this organisation; and, secondly, where are we to get the teachers?

Dr Nisbet puts his hand in the Treasury pocket for the money—some five thousand pounds per annum—required by his scheme. I do not think many of us will be so sanguine as to expect the whole financial aid could be directly obtained in this way. But it may be, I think, of significance in regard to this to consider the sources from which money has been forthcoming for what has already been done. The Government, through the Board of Agriculture, has given most, the remainder has come from the County Councils and from private contributions.

There is no reason to suppose the Board of Agriculture will be less willing in the future than it has been to aid in the establishing of forestry teaching in suitable centres; but its support from the limited funds—eight thousand pounds—at its disposal for educational purposes, is always given as a grant in aid, and is contingent upon evidence of local effort towards the end desired, which we must therefore look to in the first instance.

It is of no use to speculate upon the prospects of private munificence providing equipment in any centre. We may hope for it, but I do not think times are such as to lead us to expect large pecuniary aid from landowners. After vigorous effort amongst them, extending over some years, to secure an endowment for a chair of forestry in Edinburgh, a sum a little over two thousand pounds is all that has been raised.

But forestry is one of those subjects to the teaching of which we may be more sanguine of support from County Councils. It will always be a matter of regret to scientific men, and those interested in the industrial progress of the country, that the grand opportunity furnished by the fund dealt with under the Local Taxation Act

(1890) was not taken more advantage of by the Government of the day. Distributed, even in part, through representative educational institutions, it could have provided equipment for technical education of the highest kind beyond our dreams. Thrown at the heads of the County Councils, before these bodies had had time to settle to their prescribed work, there has been, in the opinion of those well qualified to judge, no little waste. You could not create all at once the machinery requisite for the most efficacious expenditure of half a million of money on technical teaching. Much of the work done by these bodies is admirable. It is indeed surprising, in the whole circumstances, how efficiently technical instruction has been carried out, and no doubt it will improve. But it had a most extravagant start. It is difficult to trace, in the general returns of the technical education undertaken by the County Councils, the details of their work, and I have not been able to discover how far forestry has been treated as a subject of instruction. It has not, I think, been often included. But the example of Northumberland and Durham in respect of the Newcastle chair is one that gives encouragement for thinking that if the due importance of forestry to the community were made clear, County Councils, in districts favourable for forestry and its concomitant industries, might come forward with some of the financial support needed for the provision of the educational equipment.

It appears to me that whilst we must obtain from the Government the institution of sylvicultural areas for practical instruction, our best chance of success in acquiring the necessary endowment for the rest of the teaching lies in the line of combination between the Board of Agriculture and the County Councils, with, it may be, aid from private benefactors. But if we were to draw financial support from County Councils, or from private sources, we must as a first step towards this make known, more thoroughly than it is, the nature of the national interests involved. We must disabuse landowners, land agents, and practical foresters of the notion that forestry consists in the random sticking in of trees, which anyone, no matter how unskilled, may accomplish. We must bring home to the people's minds that in science is to be found the only sure guide to proper timber-growing, and that scientifically managed forests are alike a profit to the producer, a benefit to the community of the region in which they are reared, and a source of national wealth. Once we have got so far as to create this opinion, the funds for as extended a scheme

of forestry education as may be necessary will, I venture to think, be forthcoming.

There is still the other question to answer,—Whence are the teachers to come? This is, I think, fundamental. For, given a competent teacher, he will soon find opportunity for teaching. If to-morrow the whole or even a half of the chairs suggested by Dr Nisbet as essential were founded, how should we meet the demand for men to fill them? We might, of course, draw upon the Indian Forest Service, but I do not know where you would find teachers in Britain. But if there is no prospect of such immediate requirement of teachers, that does not make the fact of their deficiency of any less moment. There is surely something wrong when men capable of giving scientific instruction in so important a practical subject are so scarce.

This is how it touches us botanists, and upon our shoulders I am disposed to throw the blame for the present outlook. We do not seem to have realised, except in relation to medicine, that modern botany has an outlet. Perhaps it has been the influence of medicine that has engendered this. We find chemists and physicists devoting their science to the furtherance of practical aims. Zoologists have applied theirs to the elucidation of problems bearing on the fishery industry, and we see in that monument to the ability and energy of Professor Ray Lankester, the marine biological laboratory at Plymouth, an experimental station which, while it contributes to the nation's prosperity, serves at the same time as a home of pure research. But where is the practical outcome of modern botany? I must not overlook such brilliant work as that of Marshall Ward, full of purpose, and significant as it is to many large industries, nor that of Oliver in its bearings on horticulture. But it does seem to me that the general trend of botanical work in Britain is not utilitarian. Perhaps as good an illustration as could be given of the slight practical importance attached by the lay mind nowadays to botany is the fact that the Scottish Universities Commissioners have made it—though I must add it is bracketed with zoology—optional with mathematics for the degree in agriculture!

It is matter of history that its utilitarian side gave the first impetus to the scientific study of botany. The plant-world, as the source of products of economic value and drugs, attracted attention, and out of this grew, by natural development, the systematic study of plants. The whole teaching of botany was at the first, and

continued for long to be, systematic and economic, and it was from this point of view that, the herbalist having become the physician, botany became so essential a branch of medical study. It is noteworthy that as an early practical outcome of the study came the establishment of botanic gardens, which, at their institution, were essentially what we would now style experimental stations, and contributed materially to the introduction and distribution of medicinal and economic plants, and to the trial of their products. If they are now in many instances simply appendages of teaching establishments, or mere pleasure-grounds, we at least in Britain are fortunate in possessing an unrivalled institution in the Royal Gardens at Kew, which still maintains, and under its present able director has enormously developed, the old tradition of botanic gardens as a centre in our vast empire, through which botany renders scientific service to our national progress.

In Britain, consequent perhaps on our colonial and over-sea possessions, the systematic side of botany continued predominant long after morphological and physiological work had absorbed the attention of the majority of workers and made progress on the Continent. Not that we were wanting in a share of such works, only it was overshadowed by the prevalent taxonomy, which in the hands of many no longer bore that relation to its useful applications which had in the first instance given it birth, and had become little more than a dry system of nomenclature.

The reaction of a quarter of a century ago, which we owe to the direct teaching of Sachs and De Bary and the influence of Darwin, many of us can remember: in it some who are here to-day had a share. Seldom I think is a revolution in method and ideas of teaching and study so rapidly brought about as it was in this instance. The morphological and physiological aspect of the subject infused a vitality into the botanical work which it much needed. The biological features of the plant-world replaced technical diagnosis and description as the aim of teachers and workers in this field of science. No weightier illustration of the timeliness of this change could be found than in the attitude of medicine. But a few years ago he would have been rash who would predict that botany would for long continue to be recognised as a part of university training essential to medical students. Its utility as ancillary to materia medica had lost point through the removal of pharmacy from the functions of the physician. But what do we see now? Not the exclusion of botany from the

university curriculum of medical study, but the recognition to such an extent of the fundamental character of the problems of plant-life, that it is now introduced into the requirements of the colleges.

But if the old taxonomic teaching was stifled by its nomenclature, there is, it seems to me, a similar element of danger in our modern teaching, lest it be strangled by its terminology. The same causes are operative as of old. The same tendency to narrowing of the field of vision, which eventuates in mistaking the name for the thing, is apparent. With the ousting of taxonomy, and as the laboratory replaced the garden and museum, the compound microscope succeeded the hand-lens, and for the paraphernalia of the systematist came the stains, reagents, and apparatus of microscopical and experimental work as the equipment necessary for the study of plants, the inwards rather than the outwards of plants have come to form the bulk of the subject-matter of our teaching, and we are concerned now more with the stone and mortar than with the general architecture and plan of the fabric; we are inclined to elaborate the minute details of a part at the expense of its relation to the whole organism, and discuss the technique of a function more in the light of an illustration of certain chemical and physical changes than as a vital phenomenon of importance to the plant and its surroundings. This mechanical attitude is quite a natural growth. It is a consequence of specialisation, and it is reflected in our research. But it must be counteracted if botany is in the future to be aught else than an academic study, as it was of old an elegant accomplishment. It has come about very much because of that want of recognition by botanists, to which I have already referred, of the natural outlets of their study—of their failure so far to see the lines through which the subject touches the national life. Modern botany has not yet found in this country its full application. It has not yet rendered the State service as it ought, and as was done by the taxonomic teaching it supplanted.

It is from this point of view that I wish to point out to you to-day that through forestry—and although I have particularly dealt with this branch of Rural Economy, what I say is equally true of horticulture and agriculture—modern botanical study should find a sphere of application by which it may contribute to our national well-being, and which would have a directive influence upon its teaching, taking it out of the groove in which it tends to run. What we botanists need to do in this connection

is to teach and to study our subject from a wider platform than that of the mere details of individual form, and to encourage our pupils to study plant-life not merely in water-cultures in the laboratory, but in the broader aspects exhibited in the competitive field of nature.

If forestry is ever to thrive in Britain, botanists must lay the foundation for it in this way. We cannot expect to make our pupils foresters, nor can they yet get the practical instruction they require in Britain. In this we must depend yet a while on Continental schools; the stream of Continental migration, which needs no longer to flow in morphological and physiological channels, must now turn in the direction of forest-schools. But we can so mould their studies and give bias to their work as will put them on the track of this practical subject. If we had only a few men so trained as competent foresters, and capable of teaching forestry, there would be an efficient corps with which to carry on the crusade against ignorance and indifference, the overcoming of which will be the prelude to the organisation of forestry schools and scientific sylviculture in Britain. The influence of the individual counts for much in a case like this. The advent of a capable man started forestry teaching in Scotland, which years of talk had not succeeded in doing. And so it will be elsewhere.

I have endeavoured, thus briefly, to sketch the position, the needs, and the prospects of forestry in Britain. Its vast importance as a national question must sooner or later be recognised. It is a subject of growing interest. Its elements are complex, and it touches large social problems; but the whole question ultimately resolves itself into one of the application of science. To botanists we must look in the first instance for the propagation of the scientific knowledge upon which this large industry must rest. They must be the apostles of forestry. And forestry in turn will react upon their treatment of botany. Botany cannot thrive in a purely introspective atmosphere. It can only live by keeping in touch with the national life, and the path by which it may at the present time best do this is that offered by forestry.

VI. *On the Preserving of Timber for Estate Purposes.*

By D. F. Mackenzie, Factor, Mortonhall, Midlothian.

On account of the scarcity of matured home-grown timber, as well as perhaps the difficulty of selling to advantage such timber as we produce, any process by which its term of "life" can be extended will be of considerable benefit to landowners, large and small, as well as to all others who use the home-grown article.

There is no doubt that if timber was felled in its proper season, that season being from the middle of November to the middle of February, a little earlier or later according to the forwardness or backwardness of the seasons, the duration of wooden structures would be increased by at least 10 per cent., being a very considerable saving in the cost of maintenance. Further, by the application of a thorough preservative process to the timber, the longevity of the structure would be increased over 300 per cent.

As is well known, wood, or timber, consists of vascular or fibrous tissue built up of bundles representing masses of tubes distinct in themselves, but fused together by the medullary system. These tubes, vasa, or pores contain large quantities of albumen and other solid, liquid, or gaseous matter, stored up ready for the use of the plant, and by the very intricate way in which these cells or tubes are connected, and the arrangement for passing the ligneous matter from one cell or tube to another, the tree is enabled, when the other necessary conditions are present, to increase its length and thickness. It is the contents of these cells that give trouble, by attracting the various forms of fungi and insects, which are always ready to attack the tissue of plants and trees in searching for their food, and thereby causing decay. Hence the necessity of applying some preventative.

The amount of "sap," in the shape of water, that has to be removed in preparing the wood for the preserving process, is very considerable, being in young firs an average of 40 per cent.; in matured fir timber slightly over 28 per cent.; in broad-leaved trees from 40 to 45 per cent.; while willows and poplars contain as much as 50 to 55 per cent. of moisture in winter. In timber cut in spring and summer, the amount of moisture is much greater. When the sap is expelled, the wood shrinks considerably, both in the direction of the medullary rays and also at right angles to them. Hence the desirability of

having the wood submitted to the preserving process as soon as possible after it is cut off the root. When this is not done, or the timber is otherwise seasoned, decomposition of the albumen and other matter in the cells is liable to produce carbonic acid, which shows itself in the fir tribe in the decay known as "bluewood."

As the sap of most broad-leaved trees contains a certain quantity of astringent matter, it rather tends to preservation than decay, if the wood, while seasoning, is slightly protected from the weather. This is especially the case if the wood is cut down in winter. "Bluewood" is scarcely known to exist in this class of timber. Therefore any process by which the soluble matter in the cells can be coagulated, without diminishing the strength of the tissue, may be adapted with great advantage. That is done chiefly by impregnating the cells with certain salts or oils.

Various methods of impregnating timber with antiseptic substances, with the object of preserving it from decay, have been adopted at different times. Of these, Sir William Burnett's —immersion in a solution of chloride of zinc; Mr Kyan's—immersion in a solution of corrosive sublimate; Mr Margery's—a solution of sulphate of copper, applied under pressure; Mr Paine's—a solution of sulphuret of barium or calcium, combined with a solution of sulphate of iron, injected successively into the wood; and Mr Bethell's—the use of heavy oil of tar, commonly termed "Creosote," injected into the wood—have been the most widely used during the last fifty years. For some time Mr Kyan's process was the one commonly adopted, and to such an extent was it used that all systems of preserving timber for constructive purposes were popularly termed "Kyanizing," irrespective of the particular process employed.

Experience, however, showed that the use of metallic salts was not successful in timber exposed to the action of water, as they were dissolved and washed out of the wood, leaving it unprotected, and the processes in which these salts were used are now seldom employed in Britain, except as a preventative of dry-rot in buildings, where the smell of creosote would be objectionable. For all other purposes "Creosoting" is practically the only method now in use in this country.

At the same time, timber impregnated with salts, such as sulphate of copper, chloride of zinc, or other antiseptics, may be used with decided advantage in those structures which are protected, by painting, roofs, or otherwise. In the construction of farm-

steadings, greenhouses and buildings of that class, as well as flooring, joists, and roofs of dwelling-houses, the process may be adopted with very great advantage. It is simple and inexpensive; sulphate of copper being a cheap product, costing usually from 12s. to 14s. per cwt., which with 2 lbs. to 20 gallons of water, and half a gallon to the cubic foot, makes a cheap but efficient preparation, and the mode of applying it simple. The dry seasoned wood is placed in an open tank, covered over with the solution, and left in the tank till thoroughly saturated. It is then taken out and allowed to dry under cover. When dry it is ready for use.

The term "creosote" is not quite accurate. Strictly speaking, *creosote* is the product of the distillation of wood, and has never been used for the preservation of timber. The "creosote" of commerce is distilled from coal-tar, which does not contain any of the true creosote.

When the coal-tar produced in the manufacture of illuminating gas is distilled, it is exposed in an iron still to a gradually increasing temperature, which ranges during the process from 180° to 750° or 800° Fahrenheit. The tar yields three main groups of products, viz.,—oils lighter than water, or crude naphthas; oils heavier than water, called dead or heavy oils, or "oil of tar"; and lastly pitch, the latter being the residue left in the still. The products are obtained very nearly in the order of their specific gravities, the more volatile coming over first, and being followed at intervals by heavier and heavier portions as the heat increases. Each portion can, if necessary, be collected separately as it comes over.

By further treatment, the first two groups can be resolved into their constituents. The light oils yield chiefly benzol, naphtha, and carbolic acid, but they are too volatile to be useful in the preservation of timber. The heavy oils, which in their crude form constitute the creosote of commerce, produce carbolic acid and other tar acids, the solid substances naphthaline and anthracene, and the heavy lubricating oils.

There has been a good deal of controversy on the question as to which constituent the preserving power of creosote is chiefly due. For some time after the antiseptic powers of carbolic acid were fully recognised, it was considered that the efficiency of creosote depended greatly upon the percentage of tar acids which it contained, and that the lighter portions of the dead oils were the best,

as they contain the largest proportion of these acids, while the naphthaline was considered to be of little value, and was excluded as far as possible.

Further investigation, however, has not confirmed this view, but has shown that carbolic acid, being very volatile, soon evaporates, and that the best results are obtained with creosotes containing a considerable proportion of naphthaline and other semi-solid constituents, which do not distil over except at the higher temperatures; and the later specifications for creosoting generally give effect to this view.

Dr C. Meymott Tidy, the well-known chemist, speaking at the Institution of Civil Engineers, London, in 1884, said that he considered the process of creosoting to be of a three-fold nature: (1) a physiological action rendering the wood a poison, so that animals would not attack it; (2) a chemical action, consisting chiefly in the coagulation of the albumen; and (3) the simple mechanical action, practically choking up the pores of the wood, so that neither air, moisture, nor life could get inside, and this he held to be by far the most important action of the three. He considered that it was highly advisable to get the heaviest creosote for the work, and that the excellence of the creosote should be determined by the amount of those oils which did not distil over at a temperature of 600° Fahrenheit; but on the other hand, having examined a very large number of creosoted timbers that had been prepared for at least a year, he was unable to detect the slightest trace of carbolic acid in them. With these views he had framed a specification for creosote, which had been largely adopted, and in which, while providing for a large proportion of the heavier constituents of the oils, he had fixed the quantity of carbolic acid as low as was consistent with obtaining a genuine creosote.

Summarised, Dr Tidy's specification provides,—

1. That the creosote shall be completely liquid at a temperature of 100° Fahrenheit, and that no deposit shall take place until the temperature of the oil falls to 93° Fahrenheit.
2. That the creosote shall contain at least 25 per cent. of constituents that do not distil over at a temperature of 600° Fahrenheit.
3. That the creosote, when tested by the caustic-soda process, shall yield a total of 8 per cent. of tar acids.

The composition and consequent weight of coal-tar, and of the dead oils made from it, vary not only with the quality of the coal from which the gas is manufactured, but also with the temperature at which it is carbonised. Dr Tidy's specification does not fix any specific gravity for creosote, but it is found that oils having specific gravities of 1040 to 1060 (water being taken as 1000) give the best results, though in some creosoting works heavy and light oils, and even shale oils, are used indiscriminately.

The volatile nature of the lighter oils is clearly shown by the result of some experiments made at the railway works at Inchicore, Dublin, in 1885, by Mr J. A. F. Aspinall, M. Inst. C.E., and communicated to the Institution of Civil Engineers of Ireland in 1886. Mr Aspinall selected sixteen dried sleepers, each 9 feet by 10 inches by 5 inches, to be creosoted with heavy oil of 1055 specific gravity, and sixteen similar sleepers to be creosoted with light oil of 974 specific gravity. When creosoted, the thirty-two sleepers were carefully wiped clean of superfluous oil, weighed, and laid flat on skids on the ground, exposed to the weather. At the end of seven months they were immersed in a large tank of pure water for four weeks, care being taken to keep them below the surface, and the water being changed once a week. They were finally placed on end, exposed to sun and rain, for a further period of four weeks. The sleepers creosoted with heavy oil absorbed 8·77 lbs. per cubic foot, or 27·4 lbs. per sleeper; and those creosoted with light oil absorbed 10·26 lbs. per cubic foot, or 32 lbs. per sleeper. The final result, two months after immersion, was that while only 0·25 lb. per sleeper of the heavy oil was lost, 2 lbs. per sleeper of the light oil had disappeared, either washed out or evaporated.

As usually practised in Britain, the process of creosoting is as follows:—The timber to be treated is placed in a cylinder or receiver constructed of iron or steel plates riveted together, and resembling in appearance a steam boiler. In large establishments, where railway sleepers, telegraph poles, or heavy timbers are creosoted, these receivers are from 50 to 60 feet long, and 6 feet or so in diameter. One or both ends of the receiver are made movable, for the purpose of inserting and withdrawing the timber. Where large quantities of timber have to be handled, this is most conveniently done by stacking it in the open on small, low-wheeled bogies, which are run into the receiver on rails laid on its floor, and though the capacity of the receiver is considerably lessened by the space occupied by the bogies, it is found that the facility with

which the timber can be placed in position and withdrawn, permits of a greater quantity being dealt with in a given time than when it is placed by hand into the receiver.

The proportion which the quantity of timber in each charge bears to the total capacity of the receiver varies with the size and form of the timber, and the manner in which it is stowed, but may be stated as being approximately 75 per cent. on the average, for such timber as railway sleepers. The timber requires to be loosely packed when placed in the receiver, so as to permit the creosote to have free access to every part of its surface.

The creosote is stored in a tank (or series of tanks) placed below the level of the receiver, so that the latter may drain into it. The storage tank may be constructed either of wood or iron, and for convenience is usually sunk into the ground immediately below the receiver. The tank requires to be large enough to contain sufficient creosote to fill the receiver after the timber is placed in it, as well as the quantity required for injection into the wood in the process of creosoting.

As the naphthaline contained in the creosote becomes solid at ordinary temperatures, it is necessary to raise the temperature of the oil to 120° Fahrenheit, in order to dissolve the naphthaline, and render the creosote perfectly fluid. This is effected by means of pipes of cast or wrought iron laid in the tanks, through which steam circulates from the boiler of the steam-engine attached to the apparatus. Similar pipes are sometimes laid inside the receiver, to keep the creosote from cooling down too quickly in cold weather.

From the lowest point of the receiver, a pipe, provided with a stop valve fixed at a convenient place, is led directly to the creosote tank. This pipe serves the double purpose of conveying the creosote to the receiver, from which the air has been exhausted, and of draining the surplus creosote from the receiver back to the tank when the process of injection is completed.

The receiver is connected by other pipes, each having a stop valve, to an air-pump, and to a force-pump, both driven by the steam-engine which works the whole apparatus, and it is also provided with a safety valve, a vacuum gauge, and a pressure gauge.

The timber having been placed in the receiver, the end door is closed and securely bolted up, a suitable packing being used to make the joint air-tight; the valves on the connecting pipes, except that leading to the air-pump, being at the same time closed.

The air-pump is started and kept going until the air is exhausted

from the receiver, the degree of the vacuum produced being shown by the gauge provided. The object of creating this vacuum is to exhaust the air from the pores of the wood, but it has no effect in extracting either natural sap or moisture in the wood.

When the air has been exhausted as far as possible, which takes from fifteen to twenty minutes according to the sizes of the receiver and air-pump, the valve on the pipe leading to the air-pump is closed, and that on the pipe which communicates directly with the creosote tank is opened. The pressure of the atmosphere operating on the surface of the creosote forces it up the pipe, and completely fills the vacuum in the receiver. The valve on the direct pipe is then closed, and that on the pipe connecting with the force-pump is opened. This pump being set in motion, more creosote is driven into the receiver, but, as it is already filled, the pressure forces the oil into the pores of the wood. The force-pump is kept going until either the desired quantity of creosote has been injected into the wood, or until the safety valve, which is usually loaded to a pressure of 120 lbs. per square inch, begins to rise. When the safety valve rises, it may be due to the creosote being forced in more rapidly than it can be absorbed by the wood, or to the pores of the wood being filled by moisture, in which case the limit of absorption in the timber is quickly reached.

The quantity of creosote injected into the wood is ascertained by noting the extent to which the level of the creosote in the storage tank falls during the time the force-pump is working. The size of this tank being known, the quantity of creosote represented by each inch of depth can readily be calculated. Thus, each inch of depth of a tank 12 feet by 8 feet would represent 50 gallons of creosote, and if there were 500 cubic feet of timber in the receiver, and it were intended that each cubic foot should be injected with one gallon, or $10\frac{1}{2}$ lbs., of oil, the force-pump would have to be kept going until the depth of the creosote in the tank was 10 inches less than it was when the pump was started. The pressure is kept on for an hour or two after the desired quantity of creosote has been injected, then, the valve on the direct pipe being opened, the surplus creosote is drained back into the tank, after which the end door is removed and the timber withdrawn, and stacked till required for use.

The usual works and appliances for creosoting are generally on a very large and costly scale. The writer has therefore designed a small creosoting apparatus, represented on the accompanying Plan (see Plate XIII.), which is suitable for estate purposes, and costs

only a moderate sum. This apparatus is designed to be worked in connection with an estate saw-mill, or by a farm steam-engine of 8 to 10 horse-power, which is quite sufficient for the purpose.

The receiver (Fig. 1) is 5 feet 6 inches in diameter for 14 feet of its length, the total length over the egg-shaped ends being 19 feet 8 inches, so that, in the central portion, it would take in timber nearly 19 feet long. The shell should be built of riveted steel plates, the door joint being formed by two heavy cast-iron rings securely riveted to the barrel and the egg-shaped end respectively, a projecting fillet on the face of the one ring fitting into a groove in the face of the other, and, being properly packed, they form a perfectly tight joint. When the door is closed, these rings are drawn tight up by eighteen steel bolts, with an eye in the end, and having cross pins fitted into snags marked A (Fig. 1) cast on the barrel ring. The door is carried by a crane (I, Fig. 1) fixed to the side of the shell, stepped into a stone on the ground, and stayed at the top to the receiver. The height of door is adjusted by means of the screw B (Fig. 2).

The fittings of the receiver consist of a lever safety valve (C, Fig. 1) with a connection for returning any overflow into the tank, a vacuum gauge, a pressure gauge, and a draining cock, with a pipe (J, Fig. 2) from the bottom of the receiver into the tank. The valve of the air exhaust-pipe (D, Fig. 1) is placed on the top of the receiver, and the pipe is carried up about 4 feet higher to guard against any creosote being drawn into the air-pump. The charging pipe from the force-pump is connected to the valve E (Figs. 1 and 2) fixed on the side of the receiver.

The air and force pumps and the gearing are driven by a belt and pulleys as shown on Figs. 3 and 4. The cast-iron chamber of the air-pump F should be 8 inches in diameter and 10 inches of stroke, having the bucket fitted with a brass valve and seat. The foot valve of air-pump (G) should be of brass, set in a separate casting, so as to be easily accessible. The force-pump H should be $2\frac{1}{2}$ inches diameter and 10 inches of stroke, with a solid cast-iron plunger and brass valves. These pumps should be fixed to a pair of cast-iron frames, as shown in Figs. 3 and 4, secured to a cast-iron sole-plate, and they would also carry the guides for the pumps and the plummer blocks for the gearing shafts. Both pumps would be driven from the main shaft on the top of the frames, which would be driven by spur wheels and pinions from the counter shaft carrying the driving pulleys, and each pump can be thrown out of gearing as required.

The receiver should be supported at the required height by timber blocks; and the creosote tank, constructed of wood, should be sunk into the ground immediately beneath it (K, Figs. 1 and 2). In the tank there should be a coil of 3-inch steam-pipes (L, Figs. 1 and 2), with inlet and blow-through cocks, to heat the creosote and render it quite fluid.

Mr Robert Melvin, Engineer, Sunnyside Foundry, Alloa, who has erected several large creosoting works, states that he could supply and erect a small apparatus like that described, including receiver and its fittings, air and force pumps, steam coil, and all connections fitted up complete, for £280. The purchaser would have to cart the apparatus from the nearest railway station to the site, provide any unskilled labour that might be required for lifting and handling, and supply timber for the supporting blocks and for the tank for holding the creosote. The price does not, of course, include the cost of any alterations which might be necessary on existing engines, or buildings, with which the apparatus may be connected. A light wooden shed, for protection from the weather, and to enable creosoting to be carried on when outdoor work was impossible, would be necessary.

Should it be impracticable to use power from an existing engine to drive the pumps, they could be made direct-acting at a slightly increased cost.

The apparatus described would be capable of creosoting about 300 cubic feet of timber at each charge, and would require the labour of two men, who could easily deal with one charge per day. With proper facilities, and additional hands for bringing forward and removing the timber, two charges per day could be treated.

Assuming that only one charge per day was treated, and that 1 gallon, or 10½ lbs., of creosote per cubic foot was used (less than half being often sufficient), and taking the cost of creosote at 3d. per gallon, and coals at £1 per ton, to cover long railway carriage and cartage, then the maximum cost per charge might be stated as follows:—

300 gallons of creosote, at 3d. per gallon, .	£3	15	0
Coals, say 15 cwts., at 20s. per ton, . .	0	15	0
Wages, two men at 3s. 6d. each, . .	0	7	0
Engine oil and sundries, say . . .	0	3	0
	£5	0	0

or an expenditure for labour and material of 4d. per cubic foot.

The process presents no difficulties, and any man of ordinary intelligence, accustomed to work saw-mill or farm machinery, could, with a little experience, carry it on successfully.

To ensure good results with the process described in the foregoing pages, it is essential that the timber should be properly seasoned, and free from moisture. By creosoting unseasoned timber, the result is that decay is hastened in place of being checked, for the creosote can only penetrate into the dry outer portion of the wood, and closes up its pores, while the sap is retained unchanged in the centre of the wood, where it ferments and causes decay. Young wood, containing a large proportion of sap-wood, can be creosoted without difficulty, if care be taken to have it thoroughly dry before treatment.

Care must also be taken that creosote of proper quality is used. Genuine creosote can be made only from coal-tar, and the shale oil and bone oil which are sometimes used in place of it should be avoided.

The durability of timber, when properly creosoted, is very great. Telegraph poles which were standing for thirty-five years, railway sleepers embedded in ballast for from twenty-five to twenty-eight years, and fencing—erected for thirty years—have all been found perfectly sound when taken down. The timber in each case was Baltic redwood, which had been properly seasoned, and then creosoted with heavy oil.

In practice, the quantity of creosote injected per cubic foot of timber varies with the purpose to which it is to be applied. Red pine, used for railway sleepers, bridges, fencing, etc., receives from 8 to 10 lbs., but when it is to be used for marine purposes, and exposed to the attacks of worms, it receives from 10 to 12 lbs. per cubic foot.

All timbers are not equally absorbent, and the quantity of creosote which can be injected into them varies considerably under different conditions. Beech has been known to absorb 18 lbs. per cubic foot; Scots pine in small pieces has taken 19 lbs.; but red pine will generally absorb about 16 lbs. when dry, though only 6 or 7 lbs. when moist. Spruce and silver fir are somewhat difficult to creosote uniformly. Some experiments made by Mr Aspinall at Dublin with large blocks, showed an absorption of 7½ lbs. per cubic foot; others with small pieces of dry wood gave results varying from 9 to 13½ lbs., but only about 7 lbs. when the wood was moist. Pitch pine will not take more than 6 or 7 lbs.; oak about 6 lbs.; and some hard woods not more than 2 or 3 lbs.

per cubic foot. Timber of this class should therefore remain in the cylinder under pressure for twenty-four hours.

Various modifications of the creosoting process have been proposed. Some of the softer woods have been treated by being dried and then immersed in hot creosote in open tanks for a time, but this has not always proved successful. Mr H. Aitken, of Falkirk, introduced a process in 1882, in which the timber was soaked in melted naphthaline for a period of from two to twelve hours, according to its bulk. With the view of getting the creosote to penetrate the wood as thoroughly as possible, its introduction, first in the form of a vapour, followed by the injection of the oil itself in the ordinary way, has been tried, but the method has been abandoned. As the solutions of metallic salts, mentioned earlier in this paper, penetrate the heart-wood of well-grown timber much more readily than creosote, the experiment has also been tried of impregnating the wood with a salt solution, and afterwards creosoting the outer portion, to keep the salt from being washed out. Some American authorities consider that a compound process of this kind gives better results than creosoting alone.

The most important modification which has been introduced is that patented in 1879 by Mr S. B. Boulton, Assoc. Inst. C.E., by which the moisture in the timber is got rid of during the creosoting process, so that newly felled or wet timber may be treated. In this method the creosote, after being introduced into the receiver, is raised to a temperature slightly exceeding the boiling point of water—212° Fahrenheit. By this means, the water in the timber is volatilised, and drawn off by the air-pump in the form of vapour, and the creosote takes its place. The heat, being communicated through an oily medium, does not injure the timber. The vapour may be passed through a condensing apparatus, and collected, when the quantity extracted can be measured. With charges of very wet sleepers, Mr Boulton has succeeded in extracting water equal in volume to 1 gallon per cubic foot, and replacing this water with an equal volume of creosote by the action of the air-pump alone. If necessary, the force-pump can be afterwards applied in the usual way.

The apparatus is of course more costly, and a good deal of additional time is required for dealing with wet timber by this process; but its advantages are very great in those cases in which time for seasoning the timber cannot be given, or where storage

room cannot be conveniently procured, although in general estate work these considerations are not likely to give trouble.

The advantages of creosoting timber, and the most suitable kinds of oil to employ, have been fully discussed in many publications. Of these, Dr C. Meymott Tidy's "Handbook of Modern Chemistry;" a valuable paper by Mr S. B. Boulton, Assoc. Inst. C.E., on "The Antiseptic Treatment of Timber," in vol. lxxviii. of the *Minutes of Proceedings of the Institution of Civil Engineers;* and a useful paper by Mr W. Greenhill, M. Inst. C.E.I., on "A Creosoting Yard for Railway Purposes," read before the Institution of Civil Engineers of Ireland in 1886, may be mentioned as worthy of reference to those interested in the question.

In concluding, the writer warmly acknowledges how greatly he has been indebted to several kind friends for many useful hints and practical information, and especially to J. B. Bennett, Esq., Assoc. M. Inst. C.E., Edinburgh, and George Bell, Esq., District Engineer, North British Railway, for their valuable assistance and facilities afforded for carefully inspecting Creosoting Works in full operation.

BRITISH FORESTRY LITERATURE.

The recent publication by Messrs Wm. Blackwood & Sons, Edinburgh, of a thoroughly revised and brought up to date edition of Dr James Brown's standard work, "The Forester," marks an epoch in the literature of Forestry, worthy of note by the Members of the Royal Scottish Arboricultural Society. The origin and improvement of the work have been almost coeval with the institution and progress of the Society. The first edition of the book, which appeared in 1847, was followed by a second edition in 1851, a third in 1860, a fourth in 1871, and a fifth in 1882, good evidence of the popularity of the work and the demand for information on Forestry subjects, even with the limited knowledge of the scientific principles of Forestry which prevailed in this country till latter times. The fact that the author of "The Forester" was elected the first *President* of the Scottish Arboricultural Society, on the 16th of February 1854, and re-elected to the honourable office in the three following years, retiring on the 6th October 1858, lends an additional interest to the Members of the Society in noting the success of his efforts to spread a sound knowledge of Forestry in all its branches among the public, as

well as for the particular benefit of his professional brethren. Of the nineteen Members who formed the first Committee, or Council of the Society in 1854, over which Mr Brown presided, only the name of one Member, Mr James Rutherford, Agent on the Kirkleatham Estate, Yorkshire, appears now, after the lapse of forty years, on the roll of Membership.

In the course of that long period many changes have taken place, and much improvement has been initiated in every branch of British Forestry. The literature, which previous to the advent of "The Forester" was of a very elementary type, has been advancing with rapid strides, especially within the last decade, until Forestry has now become a fertile subject for literary efforts, and scarcely a week passes in which something original, or translated from foreign languages, does not appear for the edification of the public and the benefit of Forestry. These, as a rule, deal with some speciality, or a particular section of the wide field occupied by Forestry in its fullest sense; and Brown's "Forester" continues to be the most comprehensive and complete among British works for the guidance of the Forester in every branch and detail of his profession.

The revision and bringing up to date, in accordance with the advanced knowledge of the times, of such an important work, has been skilfully performed by Dr John Nisbet of the Indian Forest Service. His intimate knowledge of European Forest literature, and his practical experience at home and abroad, have been made good use of in revising and compiling the materials for this, the sixth edition of Dr Brown's work, which through his able treatment has been brought completely abreast of the popular methods and practice of the day. All that was of any practical service in the present knowledge of the science and technics of forestry has been retained, while much valuable information has been added, particularly in regard to the more recent improvements and advances made in British Forestry, and the best of the economical methods of Sylviculture practised on the Continent. As a standard book of reference on Forestry subjects, "The Forester" thus still maintains its position in British literature.

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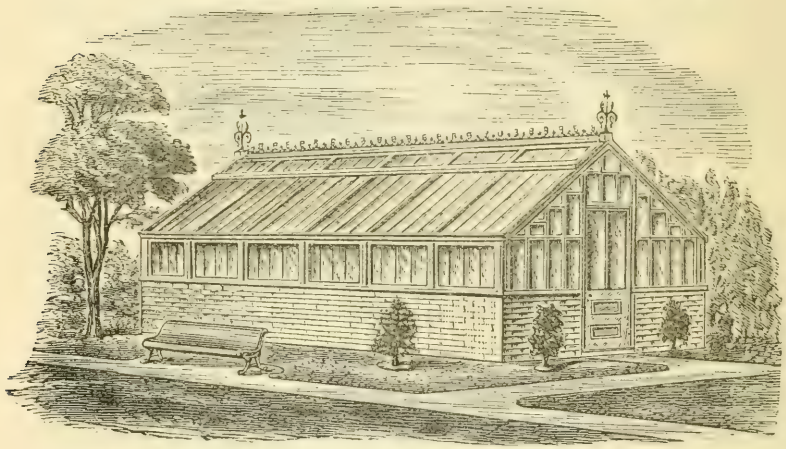

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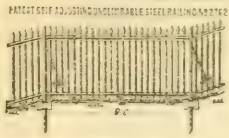

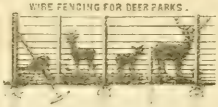

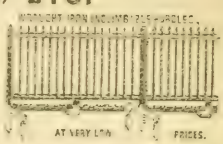

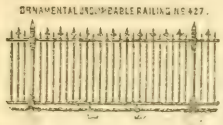

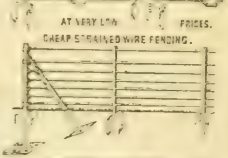

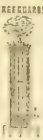

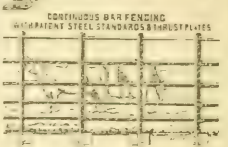

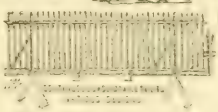

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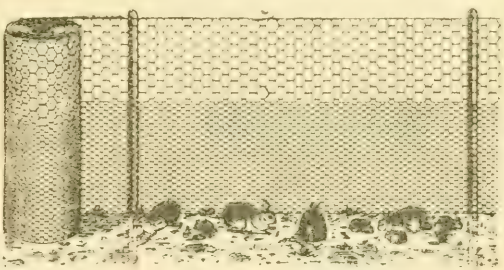

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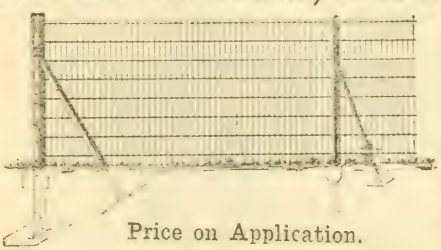

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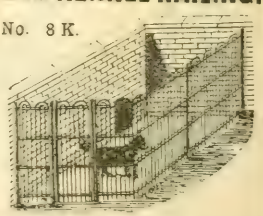

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VII. *Address delivered at the Forty-second Annual General Meeting, held on 23rd January* 1895. By R. C. Munro Ferguson, Esquire of Raith and Novar, M.P., President of the Society.

Gentlemen,—I find that the next item on the programme is my address as President, and I regret that it has been so long in being delivered. I must express the very great pleasure I feel in finding myself among so many Scottish foresters. Our numbers, apparently, are about to be largely increased; and when I heard so many new names read over just now by the Secretary, I really thought we were re-electing the whole Society.

At the close of my address, I see that we are to be engaged in the election of office-bearers. We must all of us hope that in the matters of membership or finance, or in the conduct of our business generally, we shall unite together as one man, in order to forward the interests of Forestry in Scotland. After all, the interests of Forestry are greater than the question of whether our accounts have been kept with absolute accuracy in the past; and I hope that the effect of our meeting here to-day will be judged less by any shortcomings in our system of keeping accounts, or in our way of doing business, than by the zeal which I feel sure is in each one of us, to do what we can to secure progress in a calling we all have at heart, and which many of us pursue as our means of livelihood.

Some observations were made to-day upon the manner in which the *Transactions* are presented to the Society. I am inclined to agree with those who think that the *Transactions* might be

made fuller with advantage. No doubt, to have a fine account of the trip gives those who have been at the Excursion all the pleasure that we feel when we see our names in print after attending some public function; and it makes those of us who have not had the good fortune to be present, sit with watering mouths while we read of the pleasures which those who attended the trip enjoyed. But still, the publication of our trip is not the chief end of the Scottish Arboricultural Society, and I think we might have something fuller than that. As to the present *Transactions*, there is, at any rate, one subject which is most interesting. I do not know whether it attracts me more particularly than others because I have lately started a creosoting plant. I refer to the paper of Mr D. F. Mackenzie upon "Creosoting." That is a subject which is of intense interest to all of us. I hope to see the forester and the joiner supplanting to some extent the mason and the architect. I do not think that the returns from land in these days will support the present generation of architects in their works, and I believe that, by the production of suitable timber, and by adopting means for its preservation, we may be able to house man and beast on as liberal, and far more inexpensive, a scale as we have yet attempted in this country. I think this paper, therefore, a very valuable contribution towards the *Transactions* of the Society.

When I was informed I had to make a Presidential Address, I took one or two notes of subjects which I wished to speak on at so representative a gathering as I am glad to see here. I did so with all the more pleasure, because I feel that our Scottish Society is the chief centre and the best meeting ground for all who are interested in the future of tree-growing in the United Kingdom. It is not practised in many parts of the country as a money-making undertaking, but I do think we have a better idea of the practical nature of Forestry in Scotland—that may not be saying much, but it is saying something—than they have in any of the other portions of the United Kingdom. And I think that this Society can best provide the requisite force which will be necessary for making further progress in Forestry. I am not speaking of ornamental Forestry. It is not that with which we need concern ourselves so much. I think we understand ornamental Forestry as well in Scotland as it is understood in any part of the world. I think I may say it is better understood here than in any other part of the world. I would not speak lightly for one moment of the science

of *Coniferæ*, or of any portion of the forester's art. But what I wish to say a word or two upon this afternoon is the money-making part of Forestry, because, unless you can make money out of timber-growing, you will not have any great extension of the forest area. I wish to speak upon Forestry as a paying undertaking, because I think extension will follow profits. There are one or two general principles which I think we may safely follow. One is, that trees should be grown wherever they are the best paying crop. One of the results of Free Trade has been to make the timber crop a more important one than it was, and one which offers more prospect of being paying in its results as compared with other crops which have hitherto been raised on land. I know it is held by many people—I heard it held by a very practical and highly-respected country gentleman, Mr Dundas of Arniston—that timber-growing was not a paying concern. That was in his examination before the Forestry Commission in the House of Commons. I think, however, that that view will not stand cross-examination. If you plant trees as shelter strips; if you plant strips of trees along the side of a hill, they are not likely to pay; but then they are not planted to pay as timber: they are planted to pay as shelter. But if you plant timber in sufficiently large breadths, and plant it irrespective of shelter, it is a paying crop. I think that has been shown sufficiently, and over and over again. At any rate, to me it has been shown so sufficiently—that I shall not venture to trouble you with any figures—that the growth of timber is in many cases by far the most profitable use that can be made of land. Mr Robertson, who looks after my woods at Novar, submitted to the Society some figures, which showed a profit of some 10s. an acre on growing larch. Well, I have no reason to doubt the truth of these figures; but I know this for certain, that the fee-simple value of the land upon which that larch is growing would not be worth, if it were put into the market, more than 20s. an acre. What is true of larch is, I think, also true of some kinds of hardwoods. Certainly where plane tree has been grown there has been a full return for the land so occupied in recent years. We might compare the return from the growth of timber with that from arable land. If you take the net rent from arable land, you will find that it does not repay much more than interest upon the capital which has been expended upon buildings, drainage, and roads. Now the profit from timber, if it is not very great, is at any rate net profit; and therefore I think

that if a comparison is made between land rented at anything below 10s. an acre which is now under arable farming, and land which is properly cultivated as timber land, the balance of profit will be shown very much in favour of the land which is under timber. It is certain there is a large area of land in Scotland that might be profitably planted. There are two parishes in Ross-shire which I have estimated myself carefully, along with Mr Robertson, and our conclusion was that two-thirds of these parishes might be planted, and would pay better under trees than in any other way. At the present time I think only one-eighth or one-tenth of these parishes is planted; and I believe there are parishes all over the country where, in similar proportions, planting might be done to the good of the owners and to the great good of the country.

I may mention one or two of the drawbacks and disadvantages under which Scottish Forestry labours at the present time. First, the facilities for Forestry education in this country are practically nothing. There are lectures—and very good lectures—given not a hundred miles from where we are now, and there are half-a-dozen large estates where good practical work can be done by being attached to the staffs upon these estates. But compare Scotland with Bavaria, which is a country very much the same in size. Why, in Munich there are several Forestry chairs, and there are schools, other than the university, where education in connection with Forestry can be obtained. I should think that as large a proportion of Scotland might be planted as a forest area as there is in Bavaria. Bavaria is not one whit better adapted to timber-growing than this country, but the provision for Forestry education is on a far different scale. Then, I think in this country we are under the wrong department of the State. We cannot expect very much to be done by the Board of Agriculture for Forestry. I opposed Forestry being put under the Board of Agriculture, because I was satisfied that little or nothing would be done for Forestry by that Board; and it is impossible for the Board of Agriculture, as it is at present constituted, to be of much use to Forestry, or to do much for Forestry education. Then, I think the allowances to Scottish establishments—say to the Botanic Gardens—are on a much lower scale than the corresponding allowances in England. The forest area of England is not so very much larger than the forest area of Scotland, and yet grants are given to institutions and to purposes which are helpful to Forestry in England, very much larger in proportion than the grants given

to Scotland. I think a larger proportion might be given to Scotland by the State.

Then again, even our methods of advancing the science of Forestry are somewhat scantily developed. There are not many places, even where there is a good growth of timber, where you find the Forestry staff is properly organised. I doubt whether owners of land in this country have done all they might have done to have efficient Forestry staffs. The Forestry staff on an estate is not always so efficient as the staff on an arable farm, and it is just as much needed in the one case as in the other. If you have a "blow" of timber, such as we had the other day, unless you have a staff which is able to deal promptly with an emergency like that, there must be a great loss. It is much more expensive for the timber merchant to cut up the timber than it is for the owner if he has a sufficient staff. Then the irregularity of the supply of home timber is greatly against its continuous employment for building and other purposes. The timber merchant cannot depend on a regular supply of home timber. The home market is supplied in great measure by gales of wind, or according to the necessities of the owners of the estates. If the supply were more regular and larger, dealers in home wood would be far better able to compete with dealers in foreign wood, and would be able to give much better prices for what they buy. Then I think that the State should grow timber, because private owners, on account of the long time they have to be out of capital before getting a return, are less able now than ever they were to invest their money in creating large plantations. I doubt whether Forestry in this country can be sufficiently developed unless it be by the power of the State. We are at a disadvantage in not having the State as a grower of timber; and I think the reason for the State not growing timber is probably the general belief that Forestry does not pay. It must be fully recognised in Scotland that Forestry is a national interest, before we can have any great improvement on the present system. We all of us feel very much indebted to Sir Robert Menzies for his action in trying to create a Chair of Forestry in the Edinburgh University. At the same time, I cannot help thinking—I do not speak as a member of the Treasury Board, but as a member of the Scottish Arboricultural Society, which, at the present moment, is the somewhat more important body of the two—I cannot help thinking that it should be unnecessary to ask for private subscribers

to create such a Chair, if things were well arranged in the world. The State is already supposed to equip the Scottish Universities; and I cannot say that I think any Scottish University is properly equipped where Forestry is not taught. Therefore it is my private opinion that the State ought to supply a Forestry Chair, or perhaps more than one Chair of Forestry in the Universities of Scotland; and I think we shall have to see to it—without trying to propagate any Separatist sentiment—that Scottish arboriculture, so far as it is supervised by the State, shall be supervised by some Scottish Department, or some department of the Secretary for Scotland's office, which will make it a purely Scottish branch of the administration. I think we should profit by this in more than one way. In the matter of Crown lands, for example, the State has sold a quarter of a million sterling of Crown lands in Scotland, and the money has been invested in London ground-rents. That is no good to us. If the money had been invested in plantations in Scotland, that would have been to the great good of the country.

I have alluded to "blow downs." Let me just say this about them. I do not think that these "blow downs" need necessarily be a loss to the grower of timber. Suppose we take the value of the "blow" last year. I suppose if the value of the wood blown be taken at half a million sterling, that would be accepted as a fair estimate. Well, take it that our imports are £16,000,000 or £18,000,000; it is only a fortnight's or three weeks' supply of timber. That should not disturb the market very much. I had a good many trees blown down at Raith by the first gale; and we had them lotted and sold—the sale brought about £700—within four weeks after the blow occurred. I do not think the depreciation of price was more than 10 or 15 per cent. I am at present cutting up a large lot of blown timber in Ross-shire, and I hope we may be able to give some figures applying to it. Then there is another point. I think much might be done to improve the timber trade by reduced railway tariffs for the carriage of home timber. It would pay better to grow timber if the railway service was better. That service is well enough laid out for the large towns; but it is not so well laid out as it might be for the country districts. There is a great want of communication in many districts well fitted for growing trees; and I think that anything connected with the extension of the railway system and with railway rates should have a good deal of interest for us.

Then, gentlemen, even if the State was not to undertake the management of forests itself, it might, at any rate, be able to advance money under some Lands Improvement Scheme to private owners. Money might be advanced on plantations for the first thirty years on the bare rate of interest; and if it were paid up during the following thirty or forty years, I think in that way great encouragement would be given to private owners to form plantations. These plantations would have to be under inspection, but I think there need be no difficulty about that. I should like to see the State not only planting land itself, but advancing money to help private owners to plant; because I am sure we are so far back in Forestry, and the difficulties of finding capital for improvements by land-owners is so great, that nothing but some such encouragement on the part of the State will enable Forestry to be extended as it ought to be.

It is, of course, in the Highlands that the extension of the forest area can be most easily made. I regret, for my part, that there was not a plain and specific reference made to the Deer Forests Commission to inquire into what land was suited for Forestry. It is a matter on which there are two opinions—whether the Highlands are benefited socially and economically by the extension of the small farm system. I tell you frankly my own opinion is, that socially it would be an advantage, but economically I do not expect any very great advantage from it. But I think you may justify most strongly a great extension of the area under timber; and I think it would have been most interesting if this Commission, after its journeyings in the Highlands, especially if it had had one or two practical foresters upon it, had been able to give an opinion as to what area in the Highlands was really fit for the growth of trees. That is a thing which has yet to be done, and I hope this Society and others interested in timber-growing will try to help to secure the constitution of a Committee or Commission for inquiry into what area of country now under grazings, or lying waste, might be profitably devoted to the growth of timber. The labour given by plantations is necessarily very much larger than the labour given by grazings or shootings. If you allow one family to a hundred acres of plantation, that would not be an excessive allowance; and besides the men who are actually employed in the plantations, there would be a great number of other people employed in auxiliary industries—in wood manufacture, in joiner work, in carving, in the nurseries, in planting,

in creosoting, in getting the timber to the market, and in other ways. In that way we might have a large forest population; and if you want to keep the population on the land, I am sure that in Scotland there is no better way in which that can be done than by a great extension of the forest area. Whether we are Free Traders or not, we have to recognise fairly and squarely what the effect of Free Trade has been in this country. One effect of it has been to throw a much larger area of land into grass, and it has made inferior land comparatively unremunerative. Where land comes into grass, labour must be necessarily much less abundant than if you put the land under timber. You add very largely by Forestry to the number of people that can live upon the land as compared with those who can live upon it under the grazing system. So long as grass pays best, land will go under grass. All I contend for is, that where grass is not first-rate, it is far better to put the land under timber—better for the owner, and certainly far better for the labouring population of the country. I think, too, by planting more largely it will have a very good effect upon farming. I have often noticed that where plantations are round a farm, crops are from ten days to a fortnight or three weeks earlier than on land in an exposed situation where there are no plantations. We have a healthy occupation in Forestry. Nobody looking round this room would suppose I was speaking to a town population. A country population is certainly a healthy population, and it is a danger to the State that the bulk of the population should be thrown into a few large towns, leaving the country comparatively uninhabited, and with a population which is rapidly diminishing. I deplore the thinning of the population in the country districts, and if I were asked to give a remedy for it, I could not offer one which in my opinion is better, or which can be more amply justified, than the extension of the forest area to the waste places of Scotland. We must, of course, plant upon a sufficiently large scale. It is of no use to plant in small quantities. You don't get the timber what it should be. You cannot grow timber upon the same principle as you can have small farms. If you grow timber at all, I believe it must be in large quantities, and it is to that I look when I speak of getting a return from Forestry. There is one matter, in conclusion, which seems to have created a certain panic amongst owners of trees, and that is that they would be adversely affected by the Death Duty clauses of the Finance Bill of last year. As the Bill was first presented to the House, I

imagine that it would have been severe upon timber; but as it was passed it was not so, and I don't think anybody can complain of the Death Duties as they now affect timber.

Gentlemen, I may have taken a rather prosaic view of our arboriculture; but I would urge, nevertheless, that the commercial view of Forestry should be the predominant view. I do not disparage ornamental work. I think the parks and policies of our country are perhaps the greatest of our national works. There is nothing so beautiful in the world as a Scottish or English park. There are few spots where you will find so great a value of timber in single trees; there are few spots more beautiful to behold; and when these parks can be open to the public they are of infinite value to the nation. But at the same time, they are a luxury in which every landowner cannot indulge in these days. Neither do I undervalue pinetums, because many kinds of trees have been introduced into this country by reason of the interest which has been taken in strange plants. Let every branch of our science be developed; but if the wastes of Scotland are to be clothed, if her country people are to be kept in the country, and work is to be found on the land for an increasing population, these ends will only be properly achieved if timber pays to grow. As I said, that may seem a prosaic conclusion to many as a basis to the growth of our romantic woodlands; but it is because I love trees so well, and it is because I seek to have more, and to make Scotland what she ought to be—one of the chief timber-producing countries in the world—that I have ventured in my address to lay so much stress upon this consideration, that timber should be a paying branch of our industry.

VIII. *On a Limited Liability Company to acquire a Timber Estate.* Paper read before the General Meeting, January 23, 1895, by Professor SOMERVILLE.

During the past ten years the cause of Forestry has made great progress in this country. I will not say that it has made *all* the progress that the members of this Society could have desired, but at the same time I do think we have considerable reason to be satisfied with the measure of success that has attended our efforts. The past decade has witnessed two Forestry Exhibitions, the labours of a Special Committee of the House of Commons, the institution of several centres where education in Forestry can be obtained, the formation of a Board of Agriculture, which gives such support to the subject as lies within its limited powers, the appearance of a large addition to the literature of the subject, and last, but not least, the selection of Forestry as a theme for the presidential address in an important section of the British Association. All this activity is extremely satisfactory, but, after all, has it perceptibly advanced the object that was largely instrumental in stimulating that activity? For it must not be forgotten that one of the chief objects of our Edinburgh Forestry Exhibition, of the Committee of the House of Commons, and of the pamphlets, articles, and addresses that have from time to time appeared, has been to induce private owners and the State to turn their attention to the millions of acres of poor pasture lands that abound almost everywhere, and to devote a considerable portion to the cultivation of woods.

Well, then, have we as individuals, or as a Society, succeeded in convincing the owners of suitable land that it is for their best interests to plant such land with trees, and do we find that our unproductive hill-sides are rapidly being covered by a vigorous growth of young forests? I think it will be admitted that, as a rule, the extension of our woodlands is not progressing at a rate proportionate with the enthusiasm of the advocates of extended sylviculture. For this state of things there are one or two obvious reasons. The first is that very few landlords are able or desirous of dispensing with a part of their present income, even with the prospect of their capital being returned, plus a satisfactory rate of interest, fifty

or more years hence. This reason in itself is sufficient to prevent any very large proportion of an estate being placed under wood by a single owner, for a surfeit at the end of half a century would be a very poor recompense for fifty years of starvation rations. But there is another, and quite as potent a factor at work in deterring landlords and the State from turning a larger proportion of pastoral land into forest, and it is this, that even with all that has been written before them, prospective tree-planters are still in great uncertainty as to what the true profits of Forestry really are. Nor is this uncertainty surprising, when we consider how divided opinion is in the matter. One man says that in no way can land be so profitably utilised as by planting it; while another maintains that, when all the charges are met, the profits from his woods approach uncomfortably near the vanishing point. And the reason for this diversity of opinion is a very simple one, namely, that there are few things so scarce in this country as authentic and reliable accounts dealing with any specified forest or woodland during a lengthened period. Of course, a mere statement of outgoings and incomings connected with the land under wood upon most estates would not serve the purpose, for where plantations are in small patches or narrow shelter-belts, or where they are managed largely for appearance or for game, it is a matter of very small moment to the cause of Forestry whether such woods furnish any nett revenue or not. Nor does a bare statement of the amount realised by the sale of the timber when a block of woodland is finally felled afford a satisfactory basis for calculating the profits of sylviculture, for it is quite conceivable that an acre of forest may in two distinct cases sell for £100, which in one case may mean a handsome rental for the rotation, and, in the other, may mean a dead loss.

To estimate the profits of Forestry correctly, we must be in possession of the following data. We must know the approximate pastoral or agricultural value of the land which has been planted, and capitalise such annual value at compound interest during the whole period of the rotation. We must also know how much was expended in fencing, draining, and planting the land, and also capitalise this initial expenditure at compound interest on till the period of the final felling. We must be in possession of a statement of the annual expenses incurred for taxes and management, and of the periods when thinnings were made, with the price which these intermediate returns realised. With all these facts and figures before

us, there would be no difficulty in constructing a true balance-sheet, and of definitely ascertaining what revenue the land has been yielding when utilised for sylviculture; but if such a balance-sheet is available for a wooded area of any considerable size in this country, I must confess to having been unfortunate enough not to have come across it.

Now, gentlemen, I will ask you if the advocacy of extended sylviculture in this country would not have much more weight than it has, and rest upon a surer basis, if we could at any time refer inquirers to a complete set of forest accounts dealing with a specific case, and, better still, if we could exhibit the forest from which these accounts were derived. And if it be admitted that the existence of such accounts and of such a forest would be desirable to-day, you may depend upon it that they will be not less desirable fifty years hence; and it is also just as certain that they will not be forthcoming at that time, or any other, unless someone sets about forming the wood whose balance-sheet it is so desirable to obtain.

But however desirable it may be for the country to possess a small forest about which every item of income and expenditure is accurately known, I hardly think I would have come forward to advocate its formation had its potential usefulness been limited to its accounts. But it is self-evident that a small forest, formed and managed upon strictly scientific, practical, and economic principles, with the production of timber of the highest quality as the first object of its existence, would, in many ways, exercise a beneficial influence upon the Forestry of the whole country. It would be managed by a committee of practical men, perfectly untrammelled by any considerations of game or æsthetics, and it would thus be a standing model of all that is best in modern sylviculture. It might be the practical training-ground for young foresters who had passed through such a course of scientific training as is offered by the Edinburgh classes. Its usefulness in this respect, in fact, can hardly be over-estimated, and yet it is so self-evident that I need not stop to emphasise it. If it were established on joint-stock principles, as it should be, it would afford every forester in the country, and everyone interested in forestry, the opportunity of becoming a partner in the concern, and thus of feeling that, in accordance with his means, he had as much at stake in British forestry as the owner of 10,000 acres. If it is ever insinuated that

but few of the prominent advocates of extended sylviculture belong to the landed class, a forest on the lines suggested would at once afford the opportunity of putting the cynics to silence. And, lastly, I see no reason why the venture should not be a practical illustration of "philanthropy and five per cent." If we are sincere —as I believe we are—in advising landlords under certain circumstances to invest their thousands in tree-planting, we cannot refuse to contribute to a scheme which offers everyone the chance of supporting his opinions to any reasonable extent from a pound upwards. If a feasible scheme is submitted to the country, and if it should happen that it is not heartily taken up, it will at all events have served one good purpose, in exposing the insincerity of the arguments of those who advise others to do what they would not do themselves.

The scheme, then, that I would beg to submit to the consideration of this meeting, and to all friends of Forestry, is as follows:—A few men who heartily approve of the proposal should, formally or informally, associate themselves together to ascertain where an area of land suitable for sylviculture is to be found, and when such land is found, and the selling price ascertained, a company, registered under the Limited Liability Companies Acts, should be formed to purchase it and to work it as a timber estate. The price of the shares should be £1 each, so that all may have the fullest opportunity of participating in the undertaking. No doubt the shareholders will have to wait some years for their dividends, but as I should hope that no one will invest so much as to seriously affect his income, this objection can have no particular weight. The argument that the returns will be so long deferred as in some cases to confer no benefit upon the originators of the scheme, applies, of course, to all tree-planting undertakings, and if the scheme were to hang fire from such a consideration as this, we need not expect the existing area under wood belonging to private individuals ever to be materially extended. And even although many years may elapse before returns come in, it only puts the case on a level with many other conditions that people enter into voluntarily. Life insurance, for instance, is a case in point, where, as is well known, we voluntarily enter into an agreement to pay a certain sum annually in order that we—or, what is more usual, our heirs—may ultimately benefit from our self-sacrifice.

On the assumption that the forest would become at least self-supporting in twenty-five years, I estimate that £7000 would be sufficient capital to meet all requirements, made up as follows:—

500 acres, rent 3s. per acre, at 25 years' purchase,	£1875
Expenses of transfer, registration, etc., . .	500
Planting, draining, fencing, etc., at £3 per acre,	1500
Management for 25 years, at £100 per annum,	2500
Balance to meet contingencies, . . .	625
Total, .	£7000

Such, then, are the outlines of a scheme that I cannot help thinking is capable of conferring benefits on British Forestry far in excess of the outlay involved in its accomplishment. The first step to take is to secure the promise of the necessary capital, and I should be glad if members and others desirous of supporting the scheme would communicate with me on the matter. At the same time, the project would be immensely advanced if we were in receipt of a definite offer of suitable land, and perhaps some landowner may not be averse to parting with a few hundred acres of his estate in the furtherance of the object indicated in this paper. I have the less hesitation in making these requests, seeing that subscriptions are in no sense of the word donations, but are purely of the nature of a perfectly sound, though it may be deferred, investment.

IX. *A Visit to the Thuringian Forest, within the Duchy of Saxe-Coburg-Gotha, Germany.* By JOHN MICHIE, Forester, Balmoral.

Much has been said of late years in laudatory terms about Continental forestry—more particularly that of Germany and France—recommending its adoption in the British Isles. Some favour the adoption of the Continental system in its administrative, scientific, and practical entirety, while others hold that although it could not be carried out as a whole, there are certain parts which might be imitated with great advantage to forestry in this country.

My purpose at the present time is, not to extol the Continental methods of sylviculture, nor to attempt to depreciate them—for my knowledge of them is by far too meagre for such a task—but to put before you in concise form what of the practical part of German forestry I had the privilege of seeing last year, when, through the goodness and by the command of the august patron of the Royal Scottish Arboricultural Society, Her Most Gracious Majesty the Queen, and by the kindness of His Royal Highness the Duke of Saxe-Coburg-Gotha, I was enabled to visit the Thuringer Wald.

To begin with, I shall briefly go over the route taken:—Embarking at Dover on the evening of 1st August and landing at Ostend, my line lay through Belgium *viâ* Brussels to Herbesthal, where the action of the Customs' officers reminded one that the German frontier was at hand.

By this time the British forester will have received some slight impressions from the views obtained through the windows of a railway carriage. The surface is flat or gently undulating, while the trees scattered over it are very tall. There is no sign of the common English practice of pollarding, but, on the contrary, periodical pruning of the lower side branches (clearing them off) close to the stem to encourage length and cleanness of bole is the rule, more or less. The side or lower branches before pruning are never allowed to develop to any great size, and thus the individual tree is prevented from occupying more than the least possible space of ground. I had seen no woods of important extent up to this point, but I had noticed that every available spot unoccupied by agricultural or other crops sustained its tree

or small clump of trees. These were chiefly deciduous, and mainly of the different species of the European poplar, although oak, elm, sycamore, etc., were frequent, swampy ground being occupied thickly or bordered by willows and alder.

Proceeding by Aix-la-Chapelle, the ground surface here is more broken, and the banks of a rather rapid-running stream are covered with oak coppice, apparently treated much in the same manner as coppice in this country.

The Rhine is reached at Cologne, where the land surface is again flat, but as we follow this grand river upwards the country soon gets narrowed into a deep valley worn out by the heavy current. From here all the way up stream by Coblentz and Bingen to Mayence, grape-vines, carefully cultivated for wine-making, occupy the ground on both sides of the deep valley, even on slopes so steep that they verge on the precipitous, but in such places retaining walls terrace the declivities and prevent land-slipping. The scenery is romantic—steep, projecting rocks jut out here and there, forming the sky-line, except where their summits are crowned by buildings, any one of which, we conjecture, may be a fort, convent, or prison. Low down in the valley by the railway are hamlets, and orchards hanging with fruit of great variety, while the river is laden with moving merchandise and passenger steamers.

A timber raft, several hundred feet long, was being towed down from the upper reaches by a steam-tug, and steered by men who, judging from the huts erected on its surface, evidently lived on it.

Beyond some clumps of very tall beech trees closely studded on the ground, and of no great size, I noticed no growing timber on this portion of the Rhine of much interest to the forester.

After Mayence my route lay through Frankfort-on-the-Maine and Bamberg to Coburg, which was reached late at night, twenty-three and a half hours from Brussels.

Around the ancient town of Coburg the country is hilly and well covered by forest. I spent the night of August 3rd at the Schloss Rosenau, or Castle of Roses—the birthplace of the great and good Prince Consort—which is situated a few miles from the town, and immediately south of the Thuringian range of mountains, famous for forests and forestry.

In the pleasure-grounds of "the Rosenau" are splendid specimens of trees common to Britain. I, however, saw none of very

outstanding or exceptional girth; but, towering to a height which is seldom seen in our country are the oak, elm, beech, Scots pine, etc., with clean and stately columns of 50, 60, or 70 feet.

Next day, with the retinue of the Duchess, I proceeded several hours by rail to meet the Duke at Reinhardtsbrun, another beautiful mansion, situated on the north-east verge of the Thuringian Forest, about eight miles south-east of Gotha. In Gotha there is also a very large and ancient palace belonging to the Duke.

At the railway station near Reinhardtsbrun a grand reception was given by the populace to their Royal Highnesses the Duke, Duchess, and family. Military were mounted, cannon fired, speeches of welcome made, and the school children turned out to the number of six hundred—the girls wearing wreaths of real flowers round their heads. Triumphal arches spanned the roadway at different points, while the ducal route to the Schloss or castle was strewn with green twigs of the pine.

The castle of Reinhardtsbrun is picturesquely situated within pleasure-grounds, over which are scattered in tasteful variety many fine specimens of both deciduous and evergreen trees, a few examples of which may here be given :—

The most colossal is a lime tree (*Tilia Europœa*) about 80 feet high, and girthing at 5 feet above the ground 25 feet 9 inches, length of clean bole 15 feet, diameter of spread of branches 93 feet. This grand tree spreads out into a ponderous, umbrageous, well-balanced head, ramifying very equally on all sides, showing a rugged dome-like outline from every point of view. Standing, as this tree does, atop of a small rounded knoll about a hundred yards south of the Schloss, it forms one of the most imposing specimens of the vegetable kingdom we have ever seen, and is the finest of many examples of the European lime within the grounds.

Abies alba, or white American spruce, 60 feet high.

A. excelsa monstrosa, growing near the chapel, 70 feet high, 6 feet 3 inches in girth. The peculiarity of this specimen is its branches, which depend all over the tree in swinging, thong-like tassels, 10 feet or more in length, lending to the tree a most graceful though sombre appearance.

Betula incisa, or cut-leaved birch—a fine young specimen, 3 feet 8 inches in circumference of stem.

Fagus sylvatica purpurea (purple beech), girthing 10 feet 3 inches at 5 feet up, with beautifully rounded head of very dark shade, being the largest of many specimens.

Quercus asplenifolia, or fern-leaved oak—a young tree with pleasing feathery habit, 33 feet high.

Q. variegata argentea—a beautiful object on the lawn, girthing 3 feet 9 inches, with healthy, well-marked foliage.

Q. pyramidalis, fifty years old, and fully as many feet high. Its branches press upward close to the stem, imparting to the tree the habit of the Lombardy poplar. It is said to be the best specimen of this variety in Germany.

Liriodendron tulipifera, or tulip tree, 60 feet high and 7 feet in girth.

We also observed a 40 feet high weeping beech, with 10-feet pendants; also a tall weeping ash, having a bole of 6 feet 4 inches in circumference, and covering a space of 36 feet diameter with its gracefully hanging branches. Elms, planes, and maples of various kinds and goodly sizes, with black Italian and other poplars about the ponds, diversify the landscape in these beautiful grounds; while bordering on them are many fine silver firs running up to over 100 feet high, and often measuring 3 to 4 feet in diameter and upwards at a man's height.

Now and again all over the neighbourhood the common oak is met with in trees of fair proportions, containing excellent timber.

The castle of Reinhardtsbrun, including the grounds in which these trees grow, is far inland, and stands at an altitude of about 1200 feet above the sea. The soil is chiefly a deep sandy loam. That portion of the Thuringian Forest which I had the privilege of going over extends principally to the southward of Reinhardtsbrun, spreading out to east and west for many miles. The forest proper, which covers a mountainous range stretching north-west and south-east, is many miles broad, and rises to an altitude of over 3000 feet. The range is broken up into rounded hills, and intersected by glens and hollows. The hill-sides are often steep, but there is a great deal of easy, undulating ground. The geological formation consists of sandstone and the conglomerate rock, mural cliffs of which are frequently seen cropping out in the depths of the forest.

The soil in general is composed of finely reduced sandstone, with a considerable admixture of decayed vegetable matter, forming a close, sandy loam, moist without being wet, often

very deep, but seldom rough from the presence of boulders or stones.

The flora resembles that of the lowlands of Scotland, but is more extensive, including many of our hill plants, which, however, are more luxuriant than in the Scottish glens and hill-sides.

The various trees grown are all common in Britain, and consist mostly of Norway spruce, silver fir, Scots pine, beech, oak, and hornbeam. Of these the Norway spruce may be considered the tree of the forest, covering, as it does, a much greater area than all the others combined. It shall therefore take the premier place in the following attempt to describe the practice of sylviculture in this forest land.

What the stranger is most struck with on entering this vast range of woodland, is the tallness and cleanness of the trees, and the great wealth of timber on a given space. If, as we shall suppose, he has first dipped into a portion where the trees are full grown and ready to fell, let him proceed eastward, which is the course of the prevailing strong winds, and he will soon come to the open where the last belt of trees, running at right angles to the wind, has been clean cut. Let him continue his course eastward, and in the space of a hundred yards or two he will come on young plantation lately formed, stretching away to right and left. This little experience shows that the Thuringian forester cuts his mature timber clean off the ground in narrow belts, and he follows up two years, or so, later by planting, generally with the same variety of tree, the long narrow belts which he has been clearing of the old timber, perpendicular with the course of the strong winds, always working against the wind belt by belt.

Felling is carried out in winter or early spring, the trees being often peeled of their bark (which is used in the manufactures), and the trunks in many instances allowed to lie on the ground as high and dry as possible until removed at convenience in course of the summer. There was very little appearance of rot or decay of any kind in several belts of thrown timber examined.

We have already seen that the mature timber is composed of trees of great height. They show clean stems of 50, 60, 70, and frequently more feet from the ground to the first branch, producing beautiful cylindrical columns with very little taper to the eye, the finer and taller trees being grown on the lower parts of steep hills, in glens and ravines. When at the age for clearing, which is a hundred years or a few years more,

according to any lack of demand or a desire not to cut, they stand at an average distance apart of from 12 to 16 feet, and range from 12 to 20 inches diameter at the butt end.

The quality of timber is excellent, being slowly and uniformly grown. The average tree of 16 inches diameter at the base will be found to measure 10 inches diameter at 40 to 50 feet up, and will, I estimate, contain by quarter-girth measurement 31 cubic feet. Allowing an average distance apart of 14 feet, the result is 222 trees and 6882 cubic feet of timber per acre. It is not pretended that these figures are strictly accurate, but they are as nearly so as I can calculate. Every part of the tree is made use of; even the smallest branches are gathered up, bound into sheaves, and stacked to dry for fuel, large ricks of which may be seen in the neighbouring villages. When driving through a distant part of the forest one day, two women were seen engaged loading sheaves of brushwood on a rather primitive-looking four-wheeled waggon drawn by two cows, which, my companion informed me, would be milked when they got home with their load, probably half a score of miles away.

Saw-mills are found on every stream, containing frame as well as circular saws and other wood-working machinery. The motive-power is generally obtained from the water of the rivulet, but that when insufficient is supplemented by steam. Cattle are largely used in the haulage of both the rough trunks from the forest and the manufactured timber from the mills.

Having dealt with the clearing of the old wood, we now proceed to refer to the method in common practice for re-afforesting the cleared ground. The old roots or stools are generally grubbed out, and utilised, like the brushwood, for fuel, and the ground is thus left perfectly clean, and almost free of vegetation —which, however, has begun to cover the surface by the time planting is commenced, two years after felling. Meantime, cones have been collected from the old forest during winter, the seeds extracted either by spreading in the sun's rays or in a kiln constructed for the purpose, and gentle thrashing. The nursery part of the work is carried out on the spot. Small square patches are selected on the cleared ground for that purpose at regular intervals, and say thirty yards on the side. They are thoroughly enclosed by high close fences; the soil within is carefully tilled, and the seeds sown about April in little tracks 2 inches broad and 9 inches apart. The seedlings, when two

years old, are lifted and laid in nursery lines, being thickly set in rows 14 inches between, and the following year they are planted in their permanent sites.

Planting.

The ordinary course pursued is to plant in nearly straight lines the long way of the cleared ground, the lines being from 3 to 4 feet apart. Along these lines little pits are dug (of a like distance apart, centre to centre), a foot, or even less square. The top soil is removed, and neatly laid on one side, and the under soil on the other; part of the top soil is then placed in the bottom of the pit, and from 3 to 5 plants set on it. The remainder of the top or good soil is put round the rootlets, and the operation is completed by the under soil being placed uppermost, and the whole deftly pressed down by the foot. Thus, instead of using, as we do, from 3000 to 5000 plants per acre inserted by the notch system, we find the Thuringian forester putting in $10\frac{1}{2}$ to $15\frac{1}{2}$ thousand by the method just described. I was informed that, on account of drought in early summer, all the plants in a pit occasionally die (if one survive it is considered sufficient), but the ground is carefully gone over the following season, and blanks made good.

It has already been indicated that the forest floor, from dense canopy, is almost entirely devoid of vegetation. Then, after the final cutting of old wood, several years elapse before the cleared ground becomes covered by the natural herbage of the district, but even this covering does not last long, for in a few more years the young trees so thoroughly occupy the surface that scarcely any other green thing can retain a footing on it.

There is no fencing to protect young plantations from the browsing herds of cattle, etc., belonging to the neighbouring villages. Instead of using so costly a means of protecting his trees of tender age, the forester fixes a pole of perhaps six feet in height, at each corner of the lately planted area, having a few twigs tied to its upper end, and the owner of any destroying animal found within these bounds is liable to be fined. So strictly, however, is this law adhered to and respected, that seldom has the fine to be imposed.

Many tree-planters in this country will be surprised, as I confess I was, at the great number of plants used, but surprise approaches near to alarm when we come to examine the practice of thinning.

The plantation is allowed to grow on in a thick, almost impenetrable mass, till from twenty-five to thirty years of age, when the first thinning takes place. By this time large numbers of the young trees have died, but there are still as many left as we foresters of Scotland put into the ground to begin with. In this first thinning all dead plants are removed, and as many of the weakest of the living as are required to allow just a little light to percolate through. There is sometimes another mode adopted in the first thinning, viz., the entire removal of every alternate line, which, we would say, has at least one recommend ation over the other—namely, that of facilitating the clearing out of the thinnings, which are dragged to the nearest road along the lines on which they grew.

The appearance presented by a piece of woodland just after the first thinning suggests a forest of fishing-rods with tufts of green branchlets at their apices. I here ventured the remark to one of the officials, who understood and spoke a little English, that a heavy fall of snow such as they have—and three feet deep on the ground at a time is not uncommon—must be apt to bend and break these slender stems. I was told, in reply, that their very closeness on the ground was their safety, because the one could not get down for the other.

The best of these thinnings are used for fencing in the rural districts, and, although slender, they last, it is said, from ten to fifteen years. The second thinning is made six to eight years later, and is carefully performed. The tallest and best trees are always left as nearly equidistant as possible, and there is thus maintained a damp, dark, and stagnant atmosphere beneath their living heads, which prevents lateral branches from developing to any size, and encourages the process of decay and dropping off the stem to follow the growth upwards. By this means a bole tall and clear of large knots is secured.

Light subsequent thinnings are taken every ten to fifteen years up to the age of ninety, after which no further cutting takes place till the crop is completely removed, at the age of a hundred years or more, in the manner already described.

This mode of culture has been practised for many generations on the same ground, with the same variety of tree—Norway spruce—but in different parts of the forest natural reproduction has been adopted, and there is ample evidence that the freedom from herbage of the lately cleared ground admits readily of the

germination of the natural fall of seed from the adjacent trees. This is plainly seen in the large number of seedlings which appear on the lately cleared areas and through the recently formed plantations.

Next to spruce in extent of ground occupied comes the beech, which is found growing equally thick on a given space. Having inspected a piece of forest composed of this tree, the stems were found to be tall, straight, and clean up to 60 or 70 feet, being about four-fifths of their total height. Few of them exceeded 12 to 15 inches diameter near the roots, but tapered very little, having grown very close together when young. The original soil in this wood is deeply overlain by humus, the decomposed foliage of many years. There was no trace of green herbage underneath, but in the outskirts seedlings from the mast appeared in quantity, showing that the seed matured well, and germinated readily.

I looked anxiously for the larch, but was informed that it did not succeed in those parts. Giving great promise till about ten years of age, it then became diseased: its cultivation had therefore been discontinued.

To sum up in a word. The outstanding points in the practice of forestry in the Thuringian Forest are—thick planting or sowing, long deferred and gentle thinnings, and regular clearing of mature timber, followed closely by re-afforestation.

X. *Notes on the Physiology and Structure of Trees and Shrubs as shown by the Microscope;* along with a Cabinet containing 100 Photo-Micrographic Slides illustrative of Plant Physiology specially relating to Timber. By D. F. Mackenzie, Factor, Mortonhall, Midlothian.

The micrographic slides[1] which accompany this paper, having been photographed direct from the actual tissue of the plants, are far superior for lecture and lantern purposes to natural-wood sections mounted in any medium. The natural-wood sections require a high-power micro-front lens in the lantern, while these slides give much better results with the ordinary form of lantern lens. They are also much cleaner to handle than sections mounted in Canada balsam or other media, and are not liable to damage through damp or heat.

The slides being bound in metal, and closely fastened with cement, are dust and damp proof, and are, in every way, well suited for lectures having for their object the identification of woods, as well as the illustration of the physiology of trees and shrubs.

The following is a list of the slides, and, except where otherwise stated, they are all photos of transverse sections :—

1. The Upas Tree of Java, *Antiaris toxicaria.*
2. Stem of Maize, *Zea Mays.*
3. Footstalk of Fern frond, *Pteris serrulata.*
4. Fungus germinating, *Podisoma juniperina.*
5. Pith, first year's growth of Black Italian Poplar.
6. Pith of Vine, *Vitis vinifera.*
7. Pith of Elder, *Sambucus nigra.*
8. First year's growth of Vine, *Vitis vinifera.*
9. Pith, wood, and bark, first year, *Ficus elastica.*
10. Evergreen Oak, *Quercus Ilex.*
11. False Acacia, *Robinia Pseud-Acacia.*
12. Laburnum, *Cytisus Laburnum.*
13. Cherry, *Cerasus vulgaris.*
14. Lace-bark Tree, *Lagetta lintearia.*
15. Willow, *Salix daphnoides.*
16. Honeysuckle, *Lonicera sempervirens.*
17. Judas Tree, *Cercis Siliquastrum.*
18. Pith, wood, and bark of young Ash, *Fraxinus excelsior.*
19. Two-years' seedling Elm, *Ulmus campestris.*
20. First year's growth, Cluster Pine, *Pinus Pinaster.*
21. First year's growth, Norway Spruce, *Abies excelsa.*
22. Long. rad. sect., pitted cells, *Abies excelsa.*
23. Pitted cells, Weymouth Pine, *Pinus Strobus.*
24. Rad. sect., double rows of pitted cells, *Wellingtonia gigantea.*
25. Pitted cells, *Thuja orientalis.*
26. Pitted, or bordered cells, *Araucaria excelsa.*

[1] The slides may be inspected by members of the Society on applying, in writing, to the Secretary.

27. Pitted cells, Mulberry, *Morus nigra.*
28. Scots Pine, *Pinus sylvestris.*
29. Larch, *Larix europœa.*
30. Norway Spruce, *Abies excelsa.*
31. Resinous canals in *Wellingtonia gigantea.*
32. Resinous canals in *Abies Menziesii.*
33. *Thuja orientalis.*
34. *Cedrus atlantica.*
35. *Taxodium sempervirens.*
36. *Abies pectinata.*
37. *Abies Pinsapo.*
38. *Æsculus Hippocastanum.*
39. *Rhamnus catharticus.*
40. *Celtis australis.*
41. *Ulex europœa.*
42. *Ilex aquifolium.*
43. *Quercus Suber.*
44. *Fagus sylvatica.*
45. Tang. sect., Cedar of Lebanon, *Cedrus Libani.*
46. Tang. sect., Indian Cedar, *Cedrus Deodara.*
47. Tang. sect., Chili Pine, *Araucaria excelsa.*
48. Tang. sect., Oak, *Quercus pedunculata.*
49. Tang. sect., Beech, *Fagus sylvatica.*
50. Tang. sect., Sycamore, *Acer Pseudo-Platanus.*
51. Tang. sect., Horse-Chestnut, *Æsculus Hippocastanum.*
52. Tang. sect., Pear, *Pyrus communis.*
53. Tang. sect., medullary tubes of *Wellingtonia gigantea.*
54. Tang. sect., Weymouth Pine, *Pinus Strobus.*
55. Long. sect., pitted cells in Norway Spruce.
56. Long. sect., medullary rays in Oak.
57. Seedling, Common Oak, *Quercus Robur.*
58. Lawson's Cypress, *Cupressus Lawsoniana.*
59. Bark, wood, and pith, *Pinus Pinaster.*
60. First year's growth of Oak.
61. Bark, wood, and pith of young Scots Fir.
62. Alder, *Alnus glutinosa.*
63. Elm, *Ulmus campestris.*
64. Aleppo Pine, *Pinus halepensis.*
65. Root of Hawthorn.
66. Root of Beech.
67. Root of Alder.
68. Root of Cedar of Lebanon.
69. Root of Birch.
70. Root of Mountain Ash.
71. Root of Whin.
72. Root of Oak.
73. Root of Scots Fir, first year's growth.
74. Root of Fern.
75. Adventitious root of Ivy.
76. Petiole of leaf of *Magnolia.*
77. Petiole of leaf of *Magnolia grandiflora.*
78. Leaf of *Ficus elastica.*
79. Leaf of *Pinus Pinaster.*
80. Leaf of *Pinus sylvestris.*
81. Spiral tissue from Vine, *Vitis vinifera.*
82. Spiral tissue from leaf of *Crinum amabile.*
83. Leaf of *Eucalyptus globulus.*
84. Leaf of Boxwood, showing stomata.
85. *Acer campestris.*
86. *Acer Pseudo-Platanus.*
87. *Pyrus communis.*
88. *Sambucus nigra.*
89. Long. sect., *Ilex aquifolium.*
90. Pith of *Aralia papyrifera.*
91. *Phillyrea media.*
92. Traveller's Joy, *Clematis Vitalba.*
93. Lime, *Tilia parvifolia.*
94. Weymouth Pine, *Pinus Strobus.*
95. Blue Gum, *Eucalyptus globulus.*
96. Fungus from a Geranium.
97. *Hippuris vulgaris.*
98. Ovary of Rhododendron.
99. Root of Common Dock.
100. Tree Fern, *Dicksonia antiartica.*

If we examine the structure of plants, we find that it is composed of minute cells, formed by an elastic transparent substance called cellulose, having a chemical formula of C24,H2O,O10. This is considered the base of vegetable tissue, of which there are two kinds, cellular and vascular. These constitute the elementary organs, and by their union in various forms the different functions of plant-life are carried out.

Botanists divide the vegetable kingdom into four great divisions, viz.,—Exogens, Endogens, Acrogens, and Thallogens. The exogenous plants include all trees and shrubs from the tiniest heath to the great *Wellingtonia gigantea*. The stem of Exogens, as a rule, consists of six parts, viz., (1) epidermis, (2) epiphlœum, (3) mesophlœum, (4) liber, (5) alburnum, and (6) duramen or heart-wood. Plate 1, which shows transverse section of the stem of the Upas Tree of Java, *Antiaris toxicaria*, is a very good example of this. The four outer parts are, generally speaking, composed of fibro-cellular tissue, and are blended into one mass, with the liber resting on the alburnum. All Exogens have a pith and medullary rays. Endogens, on the other hand, show no pith, medullary rays, wood, or bark in their stems, but are formed of an intermixture of bundles of fibro-vascular tissue, all held together by a zone of woody tissue attached to, and inseparable from, the stem. A typical illustration of this is the section, shown on Plate 2, of the stem of the Maize, which is almost identical with the Bamboo. These plants increase their bulk by the distention of the vascular bundles of the centre forcing outwards the bundles which were first formed. These latter, by and by, lose their vascularity and become the cortical integument or woody zone in all this division. Plate 3, the leaf stalk of *Pteris serrulata*, represents the structure of the Acrogens, which includes all the ferns. It will be observed that their structure is very distinct from that of both the Exogens and the Endogens. Plate 4 shows an example of the Thallogens, which form the lowest order of vegetable life. This plate shows *Podisoma juniperina* in the act of growing from a fracture in the bark of the Juniper. As a rule these plants are parasitic, and are generally mere expansions of cellular tissue, and they may be considered one of the great scavengers provided by Nature for reducing matter to its natural elements.

In dealing further with the subject, we will confine ourselves

exclusively to the first division, Exogens. As already stated, the stems of exogenous plants, when in their normal state, are known by having pith, medullary sheath, medullary rays, woody tissue and bark, as is shown on Plate 5, which represents a section of the stem of the Black Italian Poplar. The pith occupies the centre, and is seen as small circular discs. On the outer edge of the pith is the medullary sheath, composed of true spiral vessels presenting a dark irregular line or band, having a zone of wood on the outside of it through which the medullary rays are seen projecting into the sheath, and connected with the cambium layer. This latter, which consists of cellular tissue, shows itself as a thin dark line lying between the wood and the bark. The outer band shown on the slide is the cortex. The portion between the latter and the cambium band consists of two layers of fibro-vascular tissue, known as the "live" bark.

As above stated, the pith occupies the centre of the woody stem, as is shown by a transverse section of the Vine on Plate 6, and consists of cellular tissue, having spiral vessels originating in the medullary sheath, which itself consists of spiral vessels, and surrounds the pith connecting the medullary rays. The pith is in direct communication with the leaves through these spiral vessels. By the pith, or medullary system, the buds and leaves are supplied with oxygen, liberated by the decomposition of water, and its office is to nourish the young growth. This done, it either dies by "strangulation" or "surfeit." The section of the pith of the Elder, shown on Plate 7, is a very good example of pith-cells. Plate 8, showing the first year's growth of a Vine, is a repetition of Plate 6, but showing a much larger medullary sheath with its projections into the pith. Plate 9, showing the first year's growth of the pith, wood, and bark of *Ficus elastica*, exhibits the young wood lying upon the medullary sheath. This wood is formed by successive layers of organised matter, descending from the buds and leaves, interposed and regulated by the medullary rays, which, through the spiral vessels, connect the pith with the cambium. A section of *Quercus Ilex* on Plate 10 shows the woody layers perfected. They consist of vasiform tissue, which varies in appearance with the kind of plant producing it. The layers are concentric, and seldom or never alter their shape after once being fully formed. Their density is altered, however, by the secretions. These secretions form the duramen when deposited in the wood. When deposited in the bark and the

leaves, in the shape of gum, resin, oil, etc., they are extracted and used for medicine and other purposes. In countries having no regular summer and winter, concentric rings are seldom visible in the wood of trees; but in Europe generally each concentric layer may be taken as the growth of one season, although it is not an infallible rule.

Plates 11 to 21 are exceedingly good examples of the healthy tissue of Exogens, and they show the difference in the bark and the wood of the different types they represent; the greatest difference being found in the bark, which is well shown in a transverse section of the *Abies excelsa* on Plate 21. Bark may be said to perform the functions of clothing—protecting the young and tender woody formation from cold, drought, and other injurious influences,—but its principal work is to filter the elaborated juices as they pass from the leaves into the stem, which they do in a horizontal, or slightly declining direction. The residue of these juices passes into the roots. Hence the reason why so many secretions are found in the bark and roots compared with any other part of the tree. The elaborated sap on its descent passes horizontally through the pitted cells, or the cells with marginal borders. Examples of these cells are seen in the sections of the genus *Pinus*, and in those of *Wellingtonia gigantea*, *Thuja orientalis*, and *Araucaria excelsa*, as well as in the dotted cells of the Mulberry. In Plate 22, a section of a young spruce, we have a very good example of the pitted cells with marginal borders. In Plate 24 is seen the double-rowed cells of the *Wellingtonia gigantea;* and also in Plate 26, the double rows of the *Araucaria excelsa;* while on Plate 27, a section of the Mulberry shows quite a different form of these cells to that of the Pine tribe.

When the concentric layers of woody tissue pass from the alburnum stage to that of the duramen, these pitted or dotted cells, vessels, and pith become clogged and cease to perform their functions. This is very apparent in the duramen of the Pine and other timber trees, in which, after a lapse of time, the secretions begin to dissolve, and are carried away into the soil. At this stage what is known as "heart-rot" begins. This rot affects the spiral tissue in the medullary rays, which in turn affects the health of the plant. If Plates 28 to 37 be compared with 38 to 44, the great difference in the structure of Pine timber when compared with that of the broad-leaved trees, is

very distinctly seen. The one cannot be mistaken for the other under any circumstances. Then if we examine a longitudinal radial, or a longitudinal tangential section of any of the trees, such as Plates 45 to 55, a much greater difference is observed than by transverse sections of the same trees. These ten plates show, in a marked degree, the very great difference in the medullary plates. These medullary plates or rays are a most important feature in the individuality of each species. The rays in the Oak, Plate 48, range from a few tubes to many hundreds of thousands in one ray-plate. In the Pine tribe, however, the medullary plates are composed of a single line of cylinders, varying from two to thirty cylinders in a plate. An exception to that rule is the *Wellingtonia gigantea*, the medullary rays or cylinders of which are very inconstant, ranging from three to one hundred cylinders in a plate, and from a single line to three lines, or irregular, as in hardwood, as shown on Plate 53. Among the Pine tribe, however, in both the genera *Abies* and *Pinus*, the medullary tubes consist of single lines only; but at regular intervals there is a very peculiar break in this order of things, as is shown by a tangential section of *Pinus Strobus* on Plate 54. The same is seen on Plate 55, which is a tangential section of Norway Spruce. This plate also shows pitted cells in the longitudinal tangential section. Another distinguishing feature in the wood of the pine is the resinous canals. None of the Cedar tribe, with which we may group both the Cypress and Arborvitæ, have resinous canals, nor have the Araucarias. It is stated that the *Wellingtonia gigantea* has no resinous canals, but that is not strictly accurate. Although present, they are very inconstant, and are produced in groups of many hundreds in a single row in the early spring growth. Plate 31, which is a transverse section of the stem of the *Wellingtonia gigantea*, shows an example of this peculiarity.

It will be thus seen that the various classes of timber trees and shrubs are easily recognised, the one from the other, by the general structure of their wood—first, by the appearance of a transverse section; second, by the arrangement of the vascular tissue; and third, by the medullary plates or rays. To demonstrate this, let us carefully examine Plates 58 to 64, and it will be seen that their identification is a comparatively simple matter. No doubt, timber can also be identified by the external appearances, viz, the general contour, leaves, bark, blossom, and

fruit. These are fairly uniform and constant, but when we come to dead matter, such as a plank or log of wood, or a piece of furniture, we have not these appearances to guide us, and in the manufactured article staining and colouring, in imitation of choice and valuable woods, oblige us to appeal to the microscope, which shows us a constant uniformity in the appearance of the tissue of any piece of timber of whatever species. To illustrate this, we may take Plates 56 to 64, on which the different appearances, in section, of different woods can be compared. By comparing the transverse section of *Quercus Robur* on Plate 57, with the section of Scots Fir on Plate 61, the difference is clearly observed. Then take the transverse section of *Cupressus Lawsoniana* on Plate 58, and compare it with the sections of Pines on Plates 61 and 64, the great difference will be readily observed, there being no resinous canals in the Cypress. Again, taking the section of *Alnus glutinosa* on Plate 62, and comparing it with *Ulmus campestris* on Plate 63, an outstanding difference will be at once noticed. So uniform and constant are the appearances in the various genera that produce timber, that it is almost impossible for the student of forestry to make a mistake in identifying any piece of timber he may be required to examine. But when we come to examine the different species of the same family or genus, there is also found to be a considerable relative difference. For example, Plate 43, *Quercus Suber*, compared with Plate 10, *Quercus Ilex*, shows much difference. The reasons for such differences are still involved in obscurity. This diversity is not so apparent in the roots of trees; in fact, one might say there is an entire absence of difference, the roots of the various species of the same family constantly presenting the same appearance. In general appearance the roots of Exogens are usually the same as the stem. They have no pith, however, leaf-buds, nor stomata, but they possess all the other characteristics of the stem. The roots of the different trees may be easily distinguished one from another by the vascular tissue and medullary rays. Examples of this are given on Plates 65 to 73; while Plates 74 (the root of a Fern) and 99 (the root of the Common Dock) show a contrast in structure. It will be observed that the roots of the Beech, the Cedar, the Whin, and the Oak show, in the transverse section, all the characteristics of the stem. But while the roots have usually no normal leaf-buds, yet adventitious buds spring from the spiral tissue of the medullary rays.

All those trees that freely produce adventitious buds on their stems, such as the Alder, Elm, Elder, Lime, Oak, Poplar, Willow, and other trees and shrubs, are also those most capable of producing adventitious buds on their roots; the only conditions that are required being air, heat, and moisture. From an adventitious, or normal leaf-bud, roots may spring, and instead of a branch we have an adventitious root on the stem, such as that of the Ivy shown on Plate 75. Foresters will have often observed such adventitious roots springing from almost all the hardwood or broad-leaved trees in clefts of the bole, and more especially if the heart of the tree is decayed. Adventitious buds are found in the medullary system of all trees, but owing to the persistence of the cortex they are unable to develop into leaves. The beech "knots" are good examples of this, as are also the excrescences found upon the Elm, Lime, and Sycamore, and sometimes upon Conifers, especially the Cedar. Owing, however, to the resinous properties of the sap of most Conifers, and the dry corky nature of their bark, adventitious leaf-buds are very seldom found upon them. When they are present they are most frequently seen upon Cedars, Firs, and Spruces, when these are growing in a moist climate.

Leaves are simply a continuation of the bark, and have the same forms of tissue, which is fully illustrated on Plates 76 to 80. There is also a very good example in the leaf of the *Eucalyptus globulus* on Plate 83. The leaves are connected with the medullary sheath by spiral tissue passing up through the petiole or leaf stalk. An example of this spiral tissue is that from the Vine, shown on Plate 81. It then passes out into the blade or lamina. The latter is traversed by veins, which consist of bundles of the same vascular tissue as the petiole, and the whole is covered over with an epidermis peculiar to the species to which the leaf belongs. The epidermis of the leaf is perforated with openings called stomata, shown on the leaf of Boxwood on Plate 84. These occur upon both sides of the leaves of many plants, but generally upon the under side only, and they are very numerous, ranging from 12,000 to 200,000 in a square inch. The respiratory functions performed by these peculiar openings are well known. The remaining Plates, from 85 to 100, illustrate the interior structures of various interesting classes of plants in a similar manner to those already described.

XI. *On Growing Timber of Clean Growth, Fine Quality, and High Commercial Value.* By ARTHUR C. FORBES, Wood Manager, Bowood, Calne, Wiltshire.

In order to produce home-grown timber which shall successfully compete with that imported from abroad, it is evident that the former must be both as good in quality and as low or lower in price than the latter. These conditions raise two fundamental questions: 1st, What is the quality of the imported article? and, 2nd, Can home-grown timber be remuneratively grown and placed in the same market as the foreign at the same price?

Take the former of these questions: The quality of imported timber. The chief timber imports which affect the price of home-grown coniferous woods are the shipments of Scots pine, known in the trade as "red deal" (or red wood) and spruce (white wood), which arrive at our ports from Sweden, Russia, Canada, etc. This timber is obtained from vast natural forests, grown under conditions which, after many centuries, have resulted in the survival of the species best fitted for the soil and climate. The timber selected for export is sawn from the cleanest and most mature logs, all rough or faulty stems being rejected, or used for purposes in which quality is of little importance. An examination of an average sample of imported deals reveals the fact that the tree from which it was cut must have grown very slowly, and large knots are entirely absent. The annual rings are usually extremely narrow and uniform, and almost one-half of them are composed of what is known as "autumn-wood," or wood formed after the growing season has well advanced. Another important feature is its thoroughly seasoned condition, which enables it to be used for building purposes at once, while a distinguishing brand shows to the initiated the quality of the bulk from which it was drawn.

If we take, by way of comparison, a piece of timber from an ordinary British plantation tree as offered at a timber sale, we shall probably find it composed of broad annual rings, in which the "spring-zone," or porous portion of the wood-ring, largely predominates, especially in the rings formed during the first forty years or so. Large and coarse knots will be imbedded throughout its length, greatly weakening the strength of boards or rafters cut from it. As regards seasoning, it will in all probability be quite green, and unfit for use for a year or more as the case may be.

Clean and uniform growth, and freedom from defects arising from large knots, together with thorough seasoning, are, therefore, the characteristics of imported wood, while the reverse is too often the condition of our home productions. The value of clean growth and seasoned condition is obvious; but we may briefly give a few reasons for supposing that a slow and regular growth produces better coniferous timber than that from rapidly grown trees. The annual wood-ring of a pine or spruce is composed, as already stated, of two distinct zones, the "spring" or "summer-wood," formed during the early part of the growing season, and the "autumn-wood," formed in late summer or autumn. These two zones differ little as regards their structure, the same elements being found in both; but the cell-walls are thicker and better lignified in the autumn than in the spring wood, and this raises its specific gravity and quality. The greater durability and hardness of this autumn-wood is nowhere better exemplified than in larch or Scots pine fencing posts. After a few years' exposure, the spring-wood zones are found to have so far decayed as to leave shallow circular pits in the transverse surface of the post, while the autumn-wood is still intact. The exact causes which bring about the formation of this autumn-wood are not definitely known, but the general opinion is that it is due to the better nourishment of the cambium layer at the time of the formation of this zone, together with the pressure exerted by the bark upon the new ring. It is evident, therefore, that the greater the proportion of autumn-wood in the annual ring, the better the quality of the timber, other things being equal. Now, we invariably find that the relative breadth of the spring-zone is much greater in the case of a fast-growing tree than in one of slow growth, and it consequently follows that a piece of timber made up of narrow rings contains a larger proportion of autumn-wood than a piece formed of broad rings, and we may assume, in a general way, that the former is of better quality than the latter.

But while slow growth may be an advantage so far as quality of timber goes, and timber produced by it in natural forests duly appreciated, it may be carried to an undesirable extent in plantations grown for profit, for rapid growth is a quality we cannot afford to undervalue or ignore.

This brings us to our second point: Can home timber be produced and remuneratively sold at the same price as that imported? When we consider that our foreign imports are almost entirely

derived from vast natural forests which have simply to be felled and transported, it is clear that a timber crop in this country, artificially formed, tended, and fenced in, is burdened with many charges which have no influence whatever in regulating the price of the imported timber. It follows, therefore, that the price per cubic foot of the home crop must not fall below a certain minimum if a profit is to be forthcoming. The exact value of this minimum depends upon the rate of growth and the cost of producing the crop, but it must either be below or the same as that at which foreign timber of similar quality is quoted, if it is to hold its own in the market. Fortunately for us, the cost of felling and transport by land and sea are sufficiently heavy in the case of the imported wood to keep its price comparatively high, and by careful and economical management, and the planting of the right species, timber-growing in this country can still be carried on at a profit. We do not forget, however, that cases of profitable timber-growing are not too numerous. This is due, however, to causes which are under our own control, and not to the lowness of prices, or a lack of productive power in the soil. The Scots pine and spruce timber, which is at present such a drug upon the market, is in nine cases out of ten too rough and coarse to attract the buyer, and its low reputation prejudices him against it from the first. Again, almost all building specifications stipulate that foreign timber shall be used in buildings, simply because its quality and seasoned condition can be relied upon, whereas the greatest uncertainty exists as to what the quality or condition of home-grown timber would be if its use were permitted. Another factor which greatly affects the price of this class of timber is the irregular supply or spasmodic sales which are held in certain districts. Where a large and regular supply exists, buyers can make arrangements for the conversion and disposal of their purchases on a more economical and sounder basis than where the supply is erratic, for it cannot be denied that a large and constant supply of first-class timber creates and maintains a steady demand.

We cannot find a better field for making investigations on this subject than the Scots pine and spruce-growing districts of Germany. That country is quite as liable to suffer from foreign competition as our own, and although the Free-Trade policy may not be so well developed there as here, yet it is the high quality of the produce of German forests that enables it to compete so successfully with foreign imports. There also, as here, the greater part of the timber

is of plantation growth, and costs of formation and management have to be borne, which render strict economy essential. Yet the annual net returns from these forests vary between five and fifteen shillings per acre where the State forest department brings its highly trained and efficient skill to bear upon their management. One thing is especially noticeable in these forests, and that is their comparatively unmixed nature. Mixtures of many different species, which are so common with us, are never seen in them; and although other species than that of the main crop may be introduced, yet the maturing and development of the latter is always kept in view. The importance of this latter point cannot be overestimated when growing timber for profit, when we consider that this profit is almost entirely dependent upon the adoption of the proper rotation. If, therefore, this point is neglected, a loss is bound to occur through cutting the crop either too late or too early, and this loss may be further aggravated by market fluctuations.

One of the most important factors in growing a profitable crop of timber is the soil, which, of course, must always be considered with the situation. There are many soils and situations in which timber cannot be grown at a pecuniary profit. Amongst such may be mentioned thin peats or gravels overlying rock, on exposed hill-tops and sides, sour swamps which cannot be drained without a considerable outlay, and poor soils in high-lying and remote localities, where the yield is too small and the demand too poor to render a profit possible. The afforestation of such lands is an important question, nevertheless, but it is one which concerns the State rather than the individual proprietor, who looks for a reasonable profit in return for his outlay.

Next to the soil itself, the selection of the proper species for planting it must be attended to. Although the precise geological formation has no material influence upon tree-growth, yet we often find certain species predominant on formations of a distinctly pronounced character as regards their mineral constituents—such, for instance, as beech on chalk or limestone, oak on soils rich in potash, or Scots pine on sandy or siliceous tracts. There is little doubt that the quality of a particular kind of timber, for which a certain district has a reputation, is closely connected with the soil, and although this and other conditions appear similar to those existing in many other localities, there is a something which neither soil analysis nor surroundings can account for, but which produces a certain crop better in quantity or quality than the average.

This being so, we should do well to give this point close attention, and give that species the preference in planting which already possesses a good name in the district. Of course, this need not preclude the introduction of other species into sites which appear eminently suited to their known requirements, for the planting of one kind of tree alone is not in accordance with sylvicultural principles. Larch, for instance, may be present in a district to only a very slight extent, and yet if there appeared to be any chance of its succeeding, it would be good policy to introduce it on a more extensive scale, taking care to select such sites only as answer to its known requirements.

In the case of all conifers, a moderate or normal rate of growth is more desirable than a rapid one, and in planting a coniferous species, too rich or forcing soils should always be avoided. It is doubtful if the Scots pine timber grown in Scotland is of better quality than that grown on poor gravels in the south. In the case of the latter the more favourable climate, which would naturally induce a rapid growth, is counteracted by the poverty of the soil, and practically the same results are obtained in both cases. We are aware that the colder winters of the north are considered by some as chiefly responsible for the usual superiority of Scottish timber, but we have seen timber in the vicinity of Gordon Castle, and along the shores of the Moray Firth, which left little to be desired, and the climate in that district is proverbial for its mildness and freedom from frost. It is chiefly on the recent geological formations or diluvial deposits, where the soils are of the poorest nature, that Scots pine should be grown in the south of England, and away from these the quality of this timber is usually soft and spongy. For hardwoods, on the other hand, soil poverty is a disadvantage, as the timber is usually shaky and porous, the annual ring consisting largely of vessels which give it a low specific gravity. This is especially the case with oak and ash, in which these vessels are largely developed. In the case of beech, good soil is not such an important matter, as quality is not considered so much with this tree, and in many districts it is almost entirely used for firewood.

In producing clean timber, the sylvicultural treatment of the crop is, of course, the point upon which everything depends. As we have mentioned the produce of natural forests as a commodity which satisfies the demand for timber of high quality, we may briefly glance at the conditions under which it is grown. In

all primeval forests regeneration occurs by means of patches of seedlings which arise in gaps formed by the overthrow of old and decayed trees by wind or by seedlings growing up under the parent trees, and eventually taking their place. In the case of light-demanding species, such as Scots pine, the former kind of regeneration is the principal one, and where the crop is almost pure, these patches will often be excessively thick and crowded. Of course, the individuals which compose these groups are not all of the same age, and those first in the field will stand the best chance of thriving. In most cases, however, even the biggest and strongest will not have things all their own way, but will be obliged to contend with their nearest neighbours, and in so doing will lose their side branches at an early age. This is the secret of the clean and slow growth of imported timber; but in growing timber of the same quality artificially, we must modify our methods to satisfy economic requirements. In natural forests, not only is the proportion of small, rough, and faulty stems much too great, but the irregular ages of the trees prevent the full yield of a properly-stocked area being obtained. To remedy this, advanced sylviculture grows most crops on the even-aged principle, and as this and other methods have attained their greatest development on the Continent, and especially in Germany, a short account of the way Scots pine and spruce are grown there may not be out of place.

The planting or sowing of Scots pine differs with the soil and situation. In the loose sandy soils, which largely predominate in North Prussia, sowing is almost invariably the rule for restocking cleared areas. In this case the roots are usually grubbed, and shallow trenches are formed about four feet apart by means of the forest-plough, an implement somewhat similar to a double moulding-plough. In these trenches the seed is sown in the month of April, either by hand or with seed-barrows. About $2\frac{1}{2}$ to 3 lbs. of seed are used per acre, sometimes birch being mixed with it. Beyond keeping these seed-lines clear of weeds for the first year or two, the plants are left almost entirely alone until the twentieth or thirtieth year, when the wood is gone through in order to take out dead and suppressed trees. It is evident that by this time but a very small proportion of the original seedling crop will be in existence, and these will be the strongest and most vigorous individuals. Grown under such conditions, clean stems and small crowns will be the chief characteristics of the trees, and for the next twenty or thirty years this stem-cleaning

process will still be going on, so that by the fiftieth year or so, tall, clean, and moderately stout stems will form the remaining crop; the weak and suppressed trees having been removed at short intervals since the first thinning. Here, then, we have one condition assured—viz., *clean growth*—and we have now to consider its quality.

As already mentioned, quality cannot be considered by itself in cultivated crops, but in relation to its cost of production and the increased selling value which accompanies it. Quality in timber consists in its size and maturity, as well as its freedom from knots. A crop of clean timber at fifty years of age may therefore be lacking in the required size and maturity which is necessary in order to command the most profitable price, and growth must be encouraged to proceed until these several conditions are fulfilled. The operation usually employed for encouraging the growth of individual trees in a thick wood is *thinning*. In this country, so much importance has been attached to this work, that we find it carried out in plantations at all stages of their growth. Judicious thinning is always advantageous, but much plantation timber is spoilt during the early stages of growth by mistaken ideas on this subject. Unless the killing-off or suppression of side branches takes place before these have attained a diameter at the base of two or three inches, rough timber is produced, and no amount of skill in the after-treatment of the plantation can remedy this defect. We have seen that German foresters scarcely thin at all during the early stages, and the result is clean poles, with a certain proportion of fairly stout trees. It is the existence of a properly distributed proportion of the latter which furnishes a reliable criterion by which to judge of the value of the system and its correctness. On good soils and situations the growth of trees is fairly rapid, and the differences in individual vigour become more marked year by year, and weak individuals are quickly suppressed. In such cases the trees "thin themselves," as some express it, fairly satisfactorily, and but little assistance is required from the forester. On poor soils and bad situations the struggle for supremacy is slow and prolonged, and the trees are less able to bear the weakening tendency which accompanies crowding. The result may be, therefore, that too great a proportion of the trees are too weak and spindly to develop into good stems, and a crop of low value may be produced. While, in the former case, the forester may leave the thinning pretty much in Nature's hands, and simply remove those trees which have

practically ceased to grow, a little anticipation of the natural result may be desirable in the case of the latter, and the removal of the smaller trees gradually effected before the main crop becomes too spindly. In either case the principle is the same, but the adaptation of the principle to concrete cases constitutes the real skill of the culturist.

Of course the age at which it is intended to cut the crop, and the size of timber required, greatly modify the system of treatment. Where timber of less than 12 inches quarter-girth fetches as good a price per cubic foot as that of larger dimensions, thinning might almost be dispensed with altogether on the better soils, merely removing the suppressed trees at intervals of five years or so, according to convenience. Thus treated, the crop should be fit to cut about the seventieth year. Where additional size is accompanied by an increase in price, however, it would be more profitable to thin the crop carefully, commencing about the fortieth year, or about the period at which height-growth usually culminates, and repeating the operation at intervals until from one-half to two-thirds of the trees have been removed. The final felling may be made about the hundredth year or so, according to the growth and health of the trees. On the best Scots pine soils in North Germany, rotations of one hundred and forty years are frequently adopted; but this period would probably be too long for the poor soils in most parts of Scotland, where the height-growth is less, and finishes earlier.

On poorer soils it is advisable to attend to thinning about the twenty-fifth or thirtieth year, thinning most freely at high elevations, so that the one operation may suffice, as there will be little danger of the trees developing a bushy side-growth in such situations.

The total yield expected from an acre of Scots pine varies with soil, age, and climate; but about 8000 to 10,000 feet from the thinnings and final felling would be about the average on the better soils, falling to 4000 or 5000 feet on less favourable situations with short rotations. At an average price of 4d. per cubic foot, this would represent a gross return of £130 to £150 per acre on the former, and £50 to £60 on the latter. In spite of the relatively low value of the timber, therefore, Scots pine probably yields a better return on poor soils than any other tree we could grow, except, of course, larch. This is greatly due to the low cost at which planting can be done, and the small rental charged

for poor, heathy land, which is only fit for grouse moors or planting.

The same principles apply in growing spruce as in the case of Scots pine, and the former is usually grown on the damper portions which are not considered suitable for the pine. While the Scots pine thrives best in a fairly dry climate, the spruce prefers the moist atmosphere of hilly districts, where water is continually percolating through the soil. Few trees thrive better on damp sand, especially when it is mixed with or underlies a layer of peaty or humus-rich soil, and it also does well on a clay or chalky subsoil, but dislikes dry gravels or stiff retentive soils with stagnant moisture. In the Harz Mountains of Hanover, large tracts of mountain land are devoted to the growth of spruce. Spruce forest is rarely raised from seed on the spot, as the slow growth of the seedlings renders them liable to be choked by grass and weeds; and they are placed at a similar disadvantage when planted as seedlings by the ordinary notching method, unless this is done in furrows, as in the case of Scots pine. On steep hill-sides or broken ground, however, ploughing is out of the question, and when using small plants the "hillock" system of planting is usually adopted, the seedlings (three or more in number) being planted on small hillocks of soil raised above the general level of the ground.

Few trees have a smaller spread of branches than the spruce, and a large number can stand upon an acre of ground without suffering from overcrowding. The very objectionable nature of the knots in this timber makes clean growth a more imperative feature than is the case with some species, if anything like a remunerative price is to be obtained, and the advantage of the natural system of thinning is nowhere better exemplified than with this tree. As the height-growth of spruce continues till an advanced age, no heavy thinnings should be made until the fiftieth or sixtieth year, and only then when soil and situation are favourable to a resulting increase in growth. Great care is needed, however, to prevent damage from gales, and large gaps should be avoided as much as possible.

The low value of home-grown spruce is not an encouragement to planters to patronise it, but by growing it clean it would doubtless meet with a better sale. Its use in the wood-pulp manufacture is well known; and where large areas of spruce woods existed, capitalists might be induced to erect mills in their vicinity, and no better way of utilising large tracts of poor, peaty land could be imagined. Without Government aid, however, it is doubtful if

owners of such land are in a position to plant extensively enough to keep such industries going, and at present they are monopolised by the foreigner.

Having sketched the cultivation of Scots pine and spruce in outline, we venture to make a few remarks upon what we consider some essential conditions for coping successfully with the flood of foreign imports which is annually poured into our markets. We have already mentioned that natural forests are the chief source of our imports, and this accounts for the low price at which the timber can be purchased here. We cannot, of course, obtain our own supplies from similar sources, but we can greatly cheapen the cost of production by resorting to natural regeneration as a means of restocking our woods. The prolific crops of seedlings which appear annually or periodically in woods of indigenous species, ought not, as is usually the case at present, to perish for lack of a suitable seed-bed and conditions favourable to their development. Accidental crops or patches of healthy young trees may be seen both in the broad-leaved woods of the south and in the coniferous woods of the north, and leave no shadow of a doubt in the mind of the forester that these patches might be the rule and not the exception, if only suitable measures were taken to bring them about. The beech woods of Bucks are largely restocked by natural seeding, not, it is true, under scientific control, but sufficiently well to prove what might be done. In Scotland, again, wonderful instances of natural regeneration of Scots pine may be seen on the Strathspey estate, and the same might be repeated wherever heather abounds. We do not, of course, imply that artificial planting can be dispensed with, but that it should be regarded as a supplementary operation, and one to be performed where the natural method fails.

Regular supply of good, clean timber has been alluded to, and this is of the greatest importance. A little combination among the proprietors (or their agents) of a district might be the means of regulating the supply in accordance with the demand, and of thus preventing those gluts in the timber-market which invariably follow a heavy gale. By placing such wind-falls gradually upon the market, proprietors might obtain a better price, and not be compelled to accept the almost nominal offers made by merchants.

One thing is practically certain, planters must set their faces against that invention of the last fifty years, the mixed plantation. Whatever the advantages of a proper mixture may be, and they are

doubtless important, the indiscriminate mixing of different species in plantations is fatal to the production of good timber. If the most suitable species for the prevailing soil and climate were extensively grown in every district, and grown with a strict view to its development as timber, an improvement would soon be perceptible in our home supplies, while variations of soil could be utilised for meeting the limited demand for other kinds of timber. Considerable attention has been paid of late years to various American conifers, such as Douglas fir, *Thuia gigantea*, etc.; but however desirable these species may be from an ornamental point of view, and as fast timber producers in favourable situations, we see little to recommend them for extensive planting on the poorer soils and exposed situations, where the afforestation of land is of the most importance in the national economy.

After all is said, we do not see how *economic* forestry can ever thrive in this country without State aid of some kind or shape. The long period which elapses before the planter reaps any return for his work causes many to treat the economic importance of their woods and plantations with indifference, and to pay more attention to their ornamental and game-preserving features. A little of that generosity so freely exhibited towards the sister isle might be extended to Great Britain by the Government with good effect, and especially in fostering the industries which develop to the utmost the dormant capabilities of the soil.

XII. *The Formation of Plantations.* By James Rodger, Assistant Forester, New Scone, Perthshire.

The motto of the Society, "Ye may be aye sticking in a tree, it will be growing when ye're sleeping," was, under the circumstance, sound advice from the dying old laird to his son. Even at a much more recent date than that at which the pen of Sir Walter Scott immortalised the phrase, the average Scottish laird who stuck in a tree or trees, whether under suitable circumstances or the reverse, felt that he was simply bequeathing to his future heirs a goodly number of cubic feet of valuable timber. Too often, however, it happened that the trees were either killed by stagnant water in the soil, or blasted by strong winds which their nature was unable to withstand. Spruce and poplar were often planted on dry ridges, while that lover of dry soil, the larch, was just as often planted in a marsh.

Such injudicious and indiscriminate planting could only produce the indifferent results so common around us; for if trees grow, they also become diseased and rot while we are sleeping, and the large areas of ill-thriven woods in the country, consisting of unshapely trees of inferior quality, are only the result of the "sticking in" system. But if these woods which are an eyesore to the passer-by have been the means of showing the way to a more successful system of forestry, they have not been altogether planted in vain.

Success, however, comes often through failure; and through the failures of their forefathers, coupled with their own extended scientific knowledge, foresters have long ago discovered that trees, to come to good maturity, require to be, not "stuck in," but planted carefully and methodically in soils and situations suited to their respective peculiarities and needs. And they have learned that soils full of stagnant water, and charged with poisonous gases, cannot maintain trees in a healthy state.

The import of timber into the country at the present day is so great, that to many it may seem a matter of little importance whether home-planting be carried on or not; but let the transatlantic forests be ever so extensive, a day will come when the supply will run short, and this in itself is a sufficient reason why many of our moors and mountain sides at present lying waste should be devoted to tree-culture.

Extensive planting throughout the country would tend in some degree to raise the temperature and ameliorate the climate, while the benefits to stockmasters accruing therefrom would be very great indeed. To the ordinary observer it may seem a very simple matter to enclose a piece of ground and plant it with trees, but to the practical and conscientious forester it is an undertaking demanding his gravest consideration and best judgment. The purpose for which any given piece of ground is planted must at all times regulate the whole proceedings. It may be an effort to add to the timber-value of an estate, to provide shelter on an exposed hill-side, to form a game covert, or to improve landscape; but whatever the object may be, the manner of procedure in the formation of plantations may be summed up as follows:—

The forester plants the trees intended for the permanent crop at the distances apart which he considers sufficient for their habit and dimensions when they approach maturity. He then goes over the ground and fills up the interspaces with nurses, planting them close enough to draw up the future trees in moderation and provide them with sufficient shelter, but far enough apart to allow the nurses themselves to be of some value when taken out at the second and third thinnings, although this must at all times be a secondary consideration. But even our most experienced arboriculturists occasionally reckon without their hosts, and we sometimes find, in cases of mixed plantations, the intended crop doing badly or becoming a total failure, and the actual crop formed from among the nurses, and therefore they should also be planted as carefully as possible. As before stated, estate planting is carried on under several conditions, and for several objects, and it may not be out of place to make a few remarks on each of them under their respective headings.

I. *Planting large areas to increase the extent and value of the woodlands, and to utilise more profitably land that is drawing comparatively little revenue.*—Although planting of this kind is performed on all sorts of soils and situations, yet generally speaking it is on soil of inferior quality, and at an altitude that renders the soil damp and cold, and exposes the surface area to strong winds.

Now, it stands to reason that soil of such a nature holds only a very limited supply of plant-food in a soluble state, and large strong-rooted plants would be starved in it, to a certain extent, as regards obtaining food from the soil, while from their

proportions above ground they would be badly shaken and blasted by the prevailing winds.

It may be argued that if a large plant requires more food than a small one, its roots are farther spread, which gives it more power to find its food. This may be quite true, but it is also very apparent that any single spongiole of a small plant has a more feeble capacity for absorbing food than that of a bigger one, and can be fully supplied in comparatively poor soil. It is therefore a safe rule to use in such situations plants of small size; and although the fact must not be overlooked that very small plants are easily choked by herbage, yet when not entirely overtopped by it during the summer, it is more beneficial to them than otherwise, as it provides them with good shelter from the storms of winter. It is, however, very seldom that the natural herbage in exposed situations attains a very luxuriant growth.

In sheltered hollows, or on sunny exposures, even on high-lying ground, hardwoods may thrive well, but as a rule a mixture of larch and Scots fir are the trees best adapted for forming large plantations in exposed places, and this for two reasons: first, it is a point of great importance to make an exposed plantation as dense as possible, without overcrowding, to prevent the wind from blowing through it, and Scots fir, from its hardy nature and dense foliage, is invaluable for this purpose; and, second, it seems to be getting every day more difficult to grow healthy larch, so much so, that on all light dry soils at suitable altitudes the experiment is worth trying. When this valuable tree is planted in due proportions over large areas, the parts containing healthy trees can be preserved at the time of thinning, while the diseased portions can be cut out and the native pine left to form the crop. Of course, as the ground rises and the air gets colder, a larger percentage of Scots fir should be put in, and when extremely high ground is reached it should form the entire crop. Scots fir grows vigorously in cool soils and at high altitudes where larch would most certainly perish. On these high places it is imperative to plant thickly, and thickest on the most exposed side. (By thick planting, 3 feet apart or less is meant, and moderately thick is from $3\frac{1}{2}$ to 4 feet.) Where the ground has been previously drained, care must be taken to plant close up to the brink of the drains, to prevent the wind sweeping along their course, and retarding the growth, as well as possibly injuring the young trees before their branches closed up an extra wide space.

As regards the method of planting, the common L notch is the one usually practised, and is a reliable enough system of putting in plants of a small size, which should not exceed 12 inches in height for larch, and from 4 to 8 inches for Scots fir. The difference between a bad and a well-made "notch" is of very great importance, and almost amounts to the life or death of the plant. After the plant has been carefully inserted, the cut should be completely closed by treading with the foot, taking special care not to break the bark in the process, for it is very probable that the beginning of disease in many a larch was the reckless "heeling" it was subjected to at the time of planting.

In forming the outlines of exposed plantations, acute angles at the corners, and concave bends in the sides should be carefully avoided, as both tend to let the wind into the body of the plantation.

II. *Planting to provide shelter in exposed situations.*—Wind attains its greatest velocity on wide uninterrupted plains, and although these are seldom far above the sea-level, shelter-belts are none the less necessary, and in such places they are comparatively easy to rear. On exposed hill-sides, however, shelter raising is a difficult and slow process, yet it is a most necessary one for the wellbeing of the stock that has to subsist thereon, and means, when successfully grown, a considerable advance of rent for that particular grazing. One great obstacle to successful and rapid growth for shelter is the fact that the site to be planted is often at an altitude where hardwood trees will not grow, and sometimes much above the level of larch growth.

A close fence on the wind-swept side is the first and most important point to attend to, and as stones are generally plentiful in such places, this can be raised quickly and at a moderate cost by building a stone wall, and the higher the better. Failing a supply of stones, a stout wall of turf should be built as a means of breaking the wind. All natural growth, such as birch, mountain ash, broom, whin, and the like, should be encouraged to cover the ground, and where these are not plentiful they should be planted artificially in order to strengthen the plantation. Scots fir takes the first place among conifers for such planting, and here again large plants should be avoided, although immediately behind the sheltering fence plants of moderate size may be used, but gradually diminishing their height as the distance from the fence increases, to make a gradual drop for the wind as

it passes over the plantation. Here also thick planting should be strictly adhered to, as it is most essential for success. A shelter-belt should not be less than fifty yards wide, if density and comparative wind-exclusion are to be hoped for. It is even more imperative that the plantation should present a more or less convex side towards the prevailing winds.

III. *Planting on low-lying ground.*—This embraces a wide and varied range of work. The mild climate of such situations gives a larger choice of trees to the planter, and with so many different soils and variety of aspects, a forester on a fairly large lowland estate has a most interesting variety of work to accomplish. He can carry out many scientific experiments with much practical advantage in such circumstances, and to the benefit of the plantations under his charge.

These favoured localities might appropriately be called the home of the hardwoods. Larch also grows well, although perhaps a little too fast to be of first-class quality; and the newer coniferæ generally attain their finest dimensions.

The luxuriant growth of the natural grasses is one of the most persistent evils to be guarded against, in planting on such sites; and an inexperienced forester might make very serious mistakes in determining the size of the plants to be used, if he did not carefully examine the natural growth, and consider the matter fully before planting.

On high and exposed ground, the enclosing and planting of land make little difference in the crop of herbage, but it is altogether different in the case under notice, where operations are generally on soil inclined to be rich and strong, and carrying a crop of the more luxuriant grasses. Such land is almost always regularly pastured, and the parts showing the smoothest sward are the very places—when stock is excluded—that grow the biggest crop of grass; take for instance Cocksfoot, a grass very plentiful on lowland pasture. This grass when eaten close in early spring and summer—and cattle eat it greedily—shows a level sward, but when stock is kept off for even one season, it becomes one of our tallest of grasses, almost equalling wheat in its height. Many like examples could be given, all showing that in such situations tall plants should invariably be used. A large plant to be healthy should have correspondingly large roots, and consequently the process of transplanting is to it a much greater shock than to a smaller one, but the moisture in the soil, and

the general humidity of the climate, make its growth pretty certain. All such plants should be planted by the pit system, for let the soil be as soft as it may, the best made notch possible does not give the roots room to spread properly. Indeed, hard-wood plants of almost any size should be pitted, for although they may be small, the hard unyielding nature of their roots renders them ill adapted for the notch; not only because of the danger of breaking the roots in firming the plant, but from being so hard they have also a tendency to act as a spring and keep the cut from being made perfectly solid.

In making pits, a few points should be attended to: the turf should be pared off thinly and cut in half, ready for replacing; the soil should then be taken out to a depth of several inches, and deep enough, in any case, for the reception of the plant. Where the subsoil is inclined to be hard, the bottom should be well stirred up and left lying loosely in the pit, taking care, however, to draw it slightly to the centre, and thus give a downward droop for the roots. Where a hard "pan" exists below the upper soil, the pits should be dug in the autumn or early winter, so that the frost and atmosphere may have time to sweeten and pulverise the earth that is to come in close contact with the roots of the plant. This also greatly accelerates the work at the time of planting, and yet the system is not without its drawbacks, for, if drought sets in before the planting can be overtaken, and continues for a length of time after, not only the earth that has been excavated, but also that on the sides and bottom of the pit, loses moisture to a great extent, and the plant runs a great risk of fatal injury from drought.

In planting, great care should be taken to spread out the roots well in the bottom of the pit, and when the greatest number of them have a tendency to grow to one side of the plant, that side should be set towards the prevailing winds, as it helps greatly to keep the tree from being blown over.

A little of the best soil procurable should be placed round the roots, the pit then partly filled up and carefully trodden with the foot, after which the turf should be replaced and set firm to the neck of the plant, to prevent it working loose at the surface of the ground, straining the roots and letting in the drought.

There are exceptions to every rule, and on even the lowest lying ground there are many places that can be profitably and well planted by the "notch" system with small plants.

IV. *Planting for landscape effect* generally takes the form of clumps or hedgerows, and is often done with larger-sized plants. A proprietor who wishes to alter and improve the appearance of his estate, tries to do so as rapidly as Nature will permit him, and spares neither trouble nor expense to produce immediate and good effect. Both in the planting and preparing for the lifting of tall plants, much heavy work is necessary. To transplant a tree —say from 12 to 20 feet high—with a reasonable hope of success means much previous forethought and labour. It must be "ringed" or cut round the roots one or more years beforehand, so as to make it produce fine roots or fibres numerous enough to retain a good ball of earth when the tree is lifted and taken to its new position. After planting it in a wide roomy pit, it should be steadied by stakes or ropes until its roots get a firm hold of the ground.

In the case of hedgerows, the plants should always be tall enough to be beyond the reach of cattle and horses cropping their foliage, and every individual tree should be protected from the ground to such a height that it cannot be injured by animals of any kind.

Although planting can be generally performed according to stated rules, the forester must at all times exercise his own skill and judgment, combining in this, as in other things, good theory with sound practice.

XIII. *A Short Account of the State Forests of Prussia (including Hanover), and Messrs Heins' Nursery at Halstenbeck, visited by the Royal Scottish Arboricultural Society, July–August* 1895. Prepared from Official Sources by Dr SOMERVILLE.

THE STATE FORESTS OF LINTZEL.

29th July.

During the last nineteen years much has been done in the Province of Hanover in the direction of advancing the interests of Forestry. The State itself has spent considerable sums on the purchase of land suitable for tree-planting, and it has also created a special fund from which private individuals, associations, and communities may borrow at a low rate of interest—including redemption of capital—for the purpose of creating forests.

At Lintzel in the district of Lüneburg, and at Northeim on the Weper, the Hanoverian State Forests extend to 11,725 acres, and a recent purchase of peaty land near Gross Fullen (designed for forestry investigations and the establishment of a colony for the unemployed) embraces nearly 1092 acres. The amount of land placed under forests by the help of the loan-fund above referred to is at present 16,644 acres, so that it will be seen that the action of the Provincial Legislature has resulted in the afforestation of 29,461 acres.

[The Special Forest Loan-Fund was created by an Act of the Provincial Legislature on 3rd October 1877, and on 16th October 1880 it was enacted that Associations formed for acquiring land for tree-planting should be able to borrow at 2 per cent. interest plus other 2 per cent. for liquidation of the debt. The amount to be borrowed was limited to the sum expended in forming the woods; a further condition being that the management of the woods should be subject to the approval of the State Department of Forestry until the debt had been extinguished. Private individuals might borrow under practically similar conditions, at 2 to 3 per cent. interest plus 2 per cent. for extinction of the debt.]

Since 1880 the fund has been drawn upon to the following extent:—

Class of Borrower.	Amount borrowed.	Area afforested.
1. Forestry Associations, . .	£5,242	2,334 acres.
2. Towns and communities, . .	5,725	1,585 ,,
3. Private individuals, . . .	22,910	12,725 ,,
	Total, £33,877	16,644 ,,

At present the forest of Oerrel, near Lintzel, visited by the Society, embraces 11,565 acres. The plan of afforestation was started in 1876 with the purchase of two estates which were found to be unsuitable for agriculture, and the area has since been extended by purchase as opportunity offered. The total purchase-money expended up to date amounts to £40,200, from which may be deducted £6778 as the value of buildings, and £3150 as the value of the growing timber, leaving £30,272 as the price of the land alone, which is equal to about £2, 12s. per acre.

In the spring of 1878, the work of planting was energetically pushed forward, so that the oldest woods are now seventeen years old. It was found that the ground could be best prepared for planting by subjecting it to subsoil ploughing,—16 to 24 inches deep. This work, however, was done in narrow parallel stripes (8½ feet ploughed, and 4½ feet left undisturbed), an arrangement which saved money, prevented the formation of sand-drifts, and secured good aeration of the soil. Part of the work was accomplished by Fowler's steam-plough, but most of it by horse labour,—two to four horses being yoked in the first plough, and four to six in the subsoiler. The number of horses depended on the presence or absence of a moor-pan, which, however, did not occur on more than 1 per cent. of the total area.

The sandy-loamy nature of the soil did not offer any great difficulties to the successful preparation of the land, the main objects kept in view being the thorough mixing of the peaty superficial deposits with the stronger soil below, and the bringing up to the surface of plant food that had been washed down beyond the reach of the young trees. Land that had at one time been arable was usually prepared for tree-planting by a shallow ploughing, followed by a crop of buckwheat, after which the young trees were planted on the stubble. Besides these two methods of surface preparation, other plans were tried, but it has been found that the trees have invariably grown best where the land was deeply stirred and well worked.

Of the total area under wood, 80 per cent. has been established by planting and 20 per cent. by seeding.

Situated as the afforestation works are in a thinly-populated district, it soon became evident that the local supply of labour would be insufficient. This difficulty has been partly got over by the importation of fourteen families, who have been given a small area on which to spend their spare time in raising farm and garden crops. But the chief labour supply is derivable from a prison which has been erected at Oerrel, and which is capable of containing 150 inmates. The price paid to the prison authorities for such labour is 1s. per head per day in summer, and 9d. per day in winter,—piecework at trenching, road-making,

etc., being paid for at the rates current for free labour. Experience has shown that the amount of work done by a prisoner is only one-half that accomplished by a free labourer. Up till the end of 1894, £8732 had been paid over to the prison authorities in respect of such criminal labour, and the employment of prisoners at forestry operations has, economically and morally, been an unqualified success.

The accounts showing the expenditure at Lintzel are specially interesting, because here we have to deal, not with a forest estate in full bearing, but with a forest in process of formation. The figures, too, may be presented in a much simpler form than is usually possible, and every item of expenditure is available from the very start. Charging compound interest at 3 per cent. from the time the various items of expenditure were incurred, and deducting the various items of revenue, we find (1st April 1894) that this forest has a present value of £85,005.

EXPENDITURE.

1. Protection and Management,	£6,879
2. Buildings and Repairs,	2,237
3. Winning Wood and Birch Branches for Brooms, Lifting and Packing Plants, etc.,	1,859
4. Game and Fishings,	905
5. Forming Pastures,	802
6. Nurseries,	2,247
7. Rates and Taxes,	1,419
8. Costs of Cultivation and Planting,	20,800
9. Light Railways (2 feet gauge, at 3s. per yard),	2,648
10. Sundries, including up-keep of a Meteorological Station,	874
Total,	£40,670

INCOME.

1. Sale of Birch Branches, etc.,	£3,183
2. Rights of Grazing and Bee-keeping, Sale of Peat, Stone, Hay, etc.,	2,171
3. Game and Fishings,	370
4. Sale of Young Trees from Nurseries,[1]	4,348
5. Sundries,	1,499
Total,	£11,571

Charging 3 per cent. compound interest on expenses as incurred, and allowing the same rate on income from sales, the present capital value of the estate, with its growing stock of timber, comes to almost exactly £10 per acre.

[1] Annually about 2½ million plants for £375.

The whole forest area is subdivided by rides (23 feet or 16½ feet wide) into rectangular sections of about 35 acres. These sections are one and a half times as long as broad, the rides running out to the main roads, and facilitating the transport of the forest produce.

The bulk of the planting has been done with Scots firs and spruces, in the proportions of three or four of the former to one of the latter. One-year-old Scots firs and two-year-old spruces were employed, and blanks were filled up with larger specimens of these trees, including a few Weymouth pines, larches, and Douglas firs. On about 750 acres it has been found possible to introduce oaks as the principal species. The cost of planting about 5000 seedling Scots firs and spruces per acre (including beating up blanks for three or four seasons) has been found, in a large number of cases where the figures are available, to average 46s. per acre. A seeding of about 3½ lbs. Scots fir, 2½ lbs. spruce, and 1¾ lbs. larch seed per acre (including supplementary seeds for a year or two), is found to cost about 3s. per acre less.

All the rides are bordered with stripes of hardwoods, in order to form some protection against fire.[1] For this purpose oak and birch are chiefly employed, the latter being stripped periodically to provide material for brooms, and also to admit of the oaks getting up.

In order to determine the effects of forests on the climate, it was resolved in 1881 to erect, at a cost of £790, two meteorological observation stations, the one in the forest and the other in the open country adjoining, the latter being 311 feet above sea-level. Readings are taken daily at 8 A.M. and 2 P.M., and these are sent on to Eberswalde for comparison with the records of the other fifteen forestal meteorological stations of Prussia.

A small stream which flows through the estate has been dammed at one point and converted into a pond of some 60 acres, the fishing of which is let for £25 a year.

THE STATE FOREST OF LAUENAU.

30th July.

This forest occupies a spur of a range of low hills called the Deister, which attain a maximum elevation of 1300 feet. The steep south-west slope consists of highly calcareous soil, belonging

[1] There is a fire watch-tower near the station, from which a look-out is kept at certain seasons.

to the Jurassic formation, which is well suited to the growth of beech, while the summit of the hills, and the north-east slope, belong to a Wealden sandstone, which at the hill-foot gives place to the Wealden clay. This sandstone forms a good sandy loam, which, where sufficiently deep and moist, is well adapted to the growth of all trees, but is chiefly stocked with oak and spruce.

Where grown in pure woods, the length of the rotation is 160 years for the oak, 120 years for the beech, and 80 years for the spruce. Pure oak woods, however, are only found on the strong loam near the base of the hills; elsewhere this tree is generally mixed with beech, sycamore, and ash.

Beech is, on the whole, the principal tree of the Deister, and is propagated entirely by means of self-sown seed. In this district seed is borne every third year or so, and with proper management there is no difficulty in obtaining an abundant supply of young plants. The usual plan is to introduce strong periodic thinnings —removing about 1000 cubic feet of timber per acre each time— from the eightieth year onwards. This encourages the trees to bear abundance of seed, and, by admitting light and rain, induces more rapid decomposition of the leaf-mould that covers the ground, and so prepares a good seed-bed.

The spruce is cultivated entirely by planting, seedlings or transplants being used according to the character of the ground. The former are usually planted in bunches, a style of planting practically unknown in Scotland. The spruce woods are thinned for the first time when they are about twenty-five years old, the operation being repeated every six or eight years. The beech woods, on the other hand, are not thinned for the first time till they are about thirty-five years old.

The annual yield per acre over all averages about 43 cubic feet quarter-girth measurement, which is equal to about 57 cubic feet of actual wood, slabs included.[1] Of the total out-put, 65 per cent. of the oak, 25 per cent. of the beech, and 75 per cent. of the spruce is classed as timber, the rest being used as firewood. The average prices for timber during the last few years—calculated on the English system of measurement—have been

Oak,	.	about 1s.	per cubic foot.
Beech,	.	,, 6¼d.	,,
Spruce,	.	,, 5¾d.	,,

Beech wood for burning purposes sells at about 17s. per cord.

[1] In converting cubic metres per hectare into cubic feet per acre, I have taken 35·3 cubic feet as being equal to 1 cubic metre, and 2·47 acres as equal to 1 hectare. I have then reduced the volume so found by 25 per cent., because our system of measuring timber (the quarter-girth system) gives only about three-quarters of the volume got by the German system (the middle sectional area multiplied by the length).

THE WILD-PIG PARK AT SPRINGE.

30th July.

This park forms a part of the State Forest of Springe. In the years 1836 to 1838 it was surrounded by a wall, which encloses a total area of about 3500 acres. Some 500 acres on the north side is fairly level, the rest being hilly, and reaching an elevation of fully 1200 feet. The geological formation is the Jurassic, which here produces excellent soil, capable of offering very favourable conditions for the growth of the beech, ash, and sycamore, some of which attain a height of 120 feet. In the lower parts, where the soil is deepest, the oak is also found represented. The spruce is only grown on the poorest, steepest, and shallowest part of the area.

The woods of the park afford shelter to about 160 fallow deer and 700 wild pigs. Formerly the park also maintained 120 red deer, which, however, by peeling the trees, proved so destructive to the beeches that the animals had to be exterminated.

In managing the woods in the park, but little attention is paid to the game. The only special modification of a regular system of forestry that is introduced for the benefit of the game is the leaving of clear-felled areas for a few years unplanted, so as to increase the grazing ground of the animals. The large herd of game, however, makes it necessary to fence in all newly formed woods.

Most of the woods are managed on the even-aged high forest system, only about 500 acres being managed on an uneven-aged system. The oak woods are mostly formed by artificial sowing, the acorns being either placed in the furrow made by a "Bötzel" forest plough, or spread on the surface of the ground and afterwards covered with soil obtained from shallow parallel trenches. When acorns cannot be obtained, recourse is had to planting, the young trees being two years old, and set out 2½ to 3 feet apart. Blanks, however, are filled up with much larger trees. The oak woods, which are all worked on a rotation of 160 years, are thinned early and frequently, so as to stimulate growth and protect the young trees against over-crowding.

The beech woods are exclusively regenerated by self-sown seedlings, and are worked on a rotation of 120 years. On account of the rank growth of ground-herbage that appears in light woods, the beech forests are kept very dense, and are but sparingly thinned till sixty years old. The ground is usually prepared for the reception of the seed by the use of harrows, ploughs, and heavy hoes. The preparation of the seed-bed by means of horse

labour costs from 3s. 3d. to 6s. per acre, while hand labour entails an outlay of 10s. to 16s. per acre. The results got by the former method are quite as satisfactory as under the latter system.

In regenerating a beech wood, about ½ to 1 lb. per acre of the seed of ash and sycamore is worked into the soil, though if mother-trees of these species should be present on the area, no artificial addition of seed is necessary. The period of actual regeneration generally occupies from fifteen to twenty years. Should any blanks occur, these are filled up with well-grown plants of ash or sycamore, and in some cases a few spruces are introduced. It is not the custom in this forest to retain any standards at the end of the normal rotation, the system having proved unsatisfactory. Where specially heavy trees are wanted, it is found better to abstain from felling certain portions of the forest till the trees have attained to the desired size.

The spruce woods are all formed by the use of three or four year-old transplants.

The felling of the trees is all undertaken by the regular forest hands, the buyer in no case being allowed to fell. The timber is generally sold by auction, and last year the following prices were obtained per cubic foot, English measurement:—

	Class I.	Class II.	Class III.	Class IV.	Class V.
Oak, . .	1s. 4½d.	1s. 2d.	9½d.	6½d.	6d.
Beech, .	6¾d.	7¼d.	6¼d.	5¼d.	4½d.
Spruce, .	...	...	6¾d.	5½d.	3¾d.

Beech firewood fetched about 18s. per cord.

Of the total felling, 60 per cent. of the oak, 25 per cent. of the beech, and 75 per cent. of the spruce was classed as timber, the rest being small-wood and firewood. Most of the beech timber was employed in the manufacture of chairs and staves.

The sporting rights of the park are retained by the Emperor, who usually shoots here once a year. The chief attraction centres in the wild swine, of which about 300 head are killed annually. Fallow deer also furnish about 40 head of the total bag. The wild swine require supplementary food (maize, potatoes, etc.) during the whole year — with the exception of the autumn of good seed years, when beech mast and acorns are abundant; but the fallow deer only require attention in the matter of food during winter, when they receive beans, chestnuts, oats, hay, and maize.

TOUR THROUGH THE UPPER HARZ.

31st July and 1st August.

The Upper Harz (Oberharz) is that portion of the Harz district which includes the Brocken and the high district to the west, and comprises a total area of about 330 square miles. Part of it lies in Brunswick and part in Hanover, and, with the exception of certain portions adjoining the towns and villages, the whole consists of State Forests, comprising nearly 132,000 acres, which are under the administration of the Prussian Government.

The highest point in the Harz is formed by the Brocken, which rises to a height of 3747 feet. The streams of the Upper Harz drain into the Weser, with the exception of some insignificant streams on the eastern side, which find their way to the Elbe.

The eastern declivities of the Brocken consist of granite, which, to the west, is overlayed by shale and greywacke. In other parts of the district, however, we meet with sandstone and limestone, which belong partly to the Devonian and partly to the Lower Coal-Measures. The district is rich in minerals, which include silver, copper, zinc, lead, etc.

In winter the weather is usually very severe, the ground being generally covered with snow from October till April. The average annual temperature (taken at Clausthal, 1930 feet above sea-level) is 43° F., as compared with 47°·5 in Scotland; while the rainfall aggregates 53 inches annually, compared with about 40 inches in many parts of Scotland.

The climate does not admit of the cultivation of cereals in any part of the Upper Harz, and fruit-trees are found only in a few favoured spots. The potato, however, is cultivated with moderate success in the patches and gardens attached to the cottages. Most of the surface not under wood is devoted to pasture and meadows, but even these do not yield well without abundant manure, and this is seldom available. During the summer the cows graze in the woods, while in winter they subsist entirely on hay. The only kind of bedding used for cattle is sawdust, of which large quantities are produced in the numerous saw-mills.

The cow of the Harz constitutes a distinct breed, and much attention has been devoted to its improvement during recent years. It is essentially a "cottar's cow," giving a comparatively large yield on poor fare, and being for the most part in the hands of the miners and woodmen of this district of Germany.

In the Upper Harz the climate makes the cultivation of delicate trees impossible, and the tree *par excellence* of the district is the common Norway spruce (*Picea excelsa*). In the higher and more exposed situations even this tree grows only in a somewhat

stunted form, and it may be said to reach its maximum elevation at about 3300 feet. The other trees of the Upper Harz are not numerous; but below 1600 feet a considerable area is occupied by woods of beech, and the same tree is met with to a greater or less extent in mixture with the spruce up to 2300 feet. A few oaks, birches, and alders occur naturally in the few places that suit their growth. Sycamores and rowans are the species usually employed for planting along avenues and roads. The yew, at one time very common in the Harz, has now entirely disappeared. So far as pure woods are concerned, the following figures show the area occupied by the principal trees:—

Spruce, ...	103,590 acres.
Beech, ...	23,600 ,,
Oak, ...	5,360 ,,
Alder and Birch, ...	120 ,,

The woods in this district suffer to a very serious extent from snow-breaking, and especially spruce woods at an elevation of 1200 to 2000 feet. If the snow falls in large flakes, and especially if rather damp, it accumulates on the crowns of the trees in such quantities as sometimes to break down and completely destroy whole forests. In 1883, when the last severe visitation of this kind occurred, nearly 25,000,000 cubic feet of wood was broken down in this district alone, the whole of the damage being done in a few hours. This calamity is accountable for the scarcity of old trees, and for the comparative absence of close pole-woods, and the leaderless condition of many of the trees is also to be attributed to this cause.

Storms, on the whole, do comparatively little damage in this district; even the tornado of February 12, 1894, was accountable for but 730,000 cubic feet of blown timber, which is equal to about 5½ cubic feet per acre.

The pine weevil (*Hylobius abietis*) is found to be best combated by stubbing out the stools soon after the trees are felled. Bark beetles (*Scolytidæ*) are kept in check by peeling the trees as soon as felled, by removing all dead and unhealthy trees in the thinnings, and by laying down "catch trees" in suspected localities.

A much more serious matter is the peeling and nibbling of young trees by deer. Whereas damage by nibbling the branches is chiefly confined to the places where the deer congregate in spring, there is scarcely a spruce tree in the whole district that does not show bark wounds caused by these animals. In 1892 the Upper Harz yielded 2299 red deer and 772 roe deer; but last season the numbers were much smaller, the severe winter having killed the animals by hundreds. The red stag of this district seldom

exceeds 18 stones, but his antlers are massive, though rather deficient in points.

The streams of the Harz abound in trout, and the supply is well maintained by the action of the Government in distributing ova every year amongst the various forest districts, each of which is provided with a hatchery.

The permanent staff of forest workmen at the disposal of the administration numbers about 1000. At busy times, especially when sowing and planting are in full swing, additional hands, mostly women, are engaged temporarily. As much of the work lies in remote parts of the forest, it is found necessary to erect sheds for the accommodation of the labourers, who, at such times, only visit their homes on Saturday nights.

The permanent workmen are all registered, and each must work in any part of the district where his services may be required. They are all members of the Clausthal Mutual Provident Association (established 1713), which provides annuities for widows and orphans, pecuniary assistance during sickness or when incapacitated by accident, free medical advice and medicine, old age pensions, etc. The annual income of the society is about £3750, of which the State furnishes £1500, and the members the balance by monthly contributions.

Day labour is paid at the rate of about 2s. 3d. per day, while contract labour—and this is most general—yields from 2s. 6d. to 3s. 6d. per day. At present a considerable amount of labour is being employed on road-making, much attention being at present bestowed on this important element in the development of a forest district.

The markets in the Harz for spruce timber are very good, and prices run high. Firewood is not sold, because the various towns and villages, having the right to be supplied with a certain amount of firewood annually, it practically takes all the wood of this kind available to meet their requirements. As showing what a serious matter this servitude is, it may be mentioned that the two small towns of Clausthal and Zellerfeld alone have a right to over 17,000 cords of wood annually. To supply this firewood, timber has often to be cut before it is mature; but an arrangement has now been come to by which the villages are paid 18s. for each cord of wood that they are entitled to, but which they have not received. During the financial year 1893-94 spruce timber 20 inches in diameter sold for an average price of about 8¼d. per cubic foot, English measurement.

The average annual gross revenue from timber sales in the forests of the Upper Harz for the three financial years ending with 1892 was £141,175. During the same period the average annual expenses were £47,784, the nett annual income being thus

£93,391. These figures being derived from forests covering 131,880 acres, it follows that the average annual nett income is just over 14s. 1½d. per acre. In one district (Torfhaus) it is as low as 4s. 8d., while in another (Elend) it is as high as 28s. 6d.

Of the 103,590 acres of spruce forest in the Upper Harz, nearly 99,000 acres are worked as even-aged high forest, and the rest on the shelter-wood selection system. The latter system is practised only in the higher parts of the Brocken, on very steep declivities, and in the neighbourhood of the mines, where the smoke proves troublesome. The general rotation-period is now 120 years, though formerly it was only 100. Taking the whole forest area into consideration, it is found that the average annual out-put of timber amounts to about 35 cubic feet (English measurement) per acre, besides which, branches, tops, and small-wood produce about 10 cubic feet. The yield of *timber* varies considerably in the various forest divisions, being as low as 20 cubic feet in Torfhaus, and as high as 46 cubic feet in Osterode. Under favourable circumstances the spruces at 100 to 120 years of age attain a height of 120 feet, and at the final felling furnish 6500 cubic feet of timber (English measurement) per acre. In the higher districts, however, where many of the trees have lost their tops through snow-breaking, and where the conditions of growth are altogether less favourable, the yield will not exceed 2500 to 4000 cubic feet; while near the upper limit of tree growth the yield will seldom exceed 700 or 800 cubic feet.

Where the woods are managed on the even-aged high forest system, it is the custom to clear off the whole of the trees at the end of the rotation. Care is taken, however, not to make any single clearing very large. In order to guard against the attack of the pine weevil, a clearing is never undertaken in the neighbourhood of a young wood, for were such done the beetles would increase rapidly in the old stools, and afterwards move on to the young wood. When an area has been cleared, the stools are rooted out as quickly as possible, and after lying bare for three or four years the ground is restocked.

The shelter-wood selection system consists in the removal of mature trees wherever they occur in the wood, and it is expected that the seed naturally shed by adjoining trees will furnish plants enough to fill up the blanks. In this way it is evident that an uneven-aged wood will result, that is to say, we shall have trees of all ages growing irregularly throughout the wood. It sometimes happens that the desired object is not attained, in which case assistance has to be given by means of seed artificially sown, and even in some cases by the insertion of young plants. This system is only practised where it is undesirable to completely clear an area, such a case occurring, for instance, on a steep declivity with

shallow soil, where the action of the rain and melted snow on a denuded surface, might soon result in all the soil being washed off.

The time of commencing thinning, and the approximate number of trees to be removed, are determined according to circumstances, but it may be laid down as a general rule that spruce woods at low elevations are thinned for the first time when they are about thirty years old, while those high up the hills are left undisturbed till they have reached their forty-fifth year. To Scottish foresters these times of commencing thinning must seem unduly delayed, but this is one of the points where sylviculture at home differs so much from that practised abroad. After thinning has once been started, the operation is repeated every six or eight years.

The great majority of the spruce woods in this district are established by planting, the young trees employed being either four to five year-old transplants, or untransplanted seedlings, in the latter case three or four plants being put into each hole ("bunch-planting"). This latter system of planting is at present rising in favour, owing to the fact that the resulting woods furnish a very large quantity of thinnings, which prove useful in satisfying the demand for firewood. All the young trees are reared in temporary nurseries, which are formed wherever planting operations are to be carried on. The seed is sown in rows, and if the trees are to be transplanted in the nursery, this is usually done when they are two years old, after which they stand other two years.

THE ACADEMY OF FORESTRY AT EBERSWALDE AND ITS SURROUNDING WOODS.

2nd and 3rd August.

The Forestry School at Eberswalde was founded in 1830, for the purpose of affording a thorough technical education to those intending to enter the State Forest service of Prussia. Prussia has also another Forestry School at Munden, which, however, was not founded till 1868. These schools are also attended by students qualifying for the management of private and communal forests, as well as by foreigners, notably Russians.

At present there are from 50 to 60 students at Eberswalde, though in 1880 there were as many as 216. The decrease in the attendance is due to the scarcity of appointments, as a consequence of so many men having qualified during last decade.

The permanent staff at the Academy of Eberswalde consists of the following:—Dr Dankelmann (Director), Dr Schwappach, Forstmeister Runnebaum, Forstmeister Zeising, and Dr Kienitz, all of whom attend to the various branches of Forestry. Then we have Dr Remelé (Chemistry, Mineralogy, and Geology), Dr Altum (Zoology), Dr Muttrich (Physics and Meteorology), Dr Ramann (Relation of Trees to Soil and Situation), and Dr Schwarz (Botany). These senior members of the staff have all assistants, who attend to the demonstrations, but usually give courses of lectures as well. Instruction in Forest Law is attended to by Dr Dickel from Berlin, and Agriculture by Dr Canstein, formerly of the Agricultural College in Berlin.

Eberswalde is the centre of a large system of forestal investigation and experiment, which is carried on throughout the whole of Prussia, and embraces Technology, Geology, Mineralogy, Meteorology, Botany, and Zoology.

Extensive collections, libraries, nurseries (30 acres), fish hatcheries, seed-kilns, and the neighbouring forests (40,000 acres), constitute important adjuncts to the teaching of the lecture-room. Visits to the forest two or three times a week form a regular part of the training, and a fortnight's excursion to some more distant wooded area is usually arranged at the end of the summer session.

Candidates for entrance to the Prussian Forest Service must first of all furnish a school "leaving certificate," and produce a doctor's certificate of physical fitness. They then spend a year at practical work in the woods under the direction of a State Oberforster. During this year of preparation, the candidate gains some knowledge of practical detail, and is able to convince himself, before too late, whether a forester's life is likely to suit him or not. At the end of this period, the aspirant is ready to begin his scientific training, which consists of two years at the Forest Schools of Eberswalde or Munden, and of one year in some university where Law and Political Economy may be studied. At the end of these three years the student presents himself for his first examination, and should he be successful in getting through, he is designated a Forstreferendar. The next step is to select a State Forest with as varied conditions as possible, in which two years are spent, fifteen months of which are specially devoted to Forest protection, Forest administration, and the preparation of Forest working plans. During these two years the candidate has to keep a diary, in which he makes a short record of his observations, and which serves as an index of his diligence. Then follows the second examination, after which the young forester is called a Forstassessor, and enters upon active employment.

The soil of the district round Eberswalde consists of alluvial

sands and marls. The quality of the soil for the growth of trees depends largely on the depth of the marl and on its degree of weathering. The surface geology of the whole district has been very carefully worked out, so that it is known exactly which trees will thrive best in the various situations. The silver fir and spruce are not indigenous to this district, but the latter is used to some extent in filling up blanks. Here, as in East Prussia generally, the Scots fir and oak are the most important trees, the beech being found growing in pure woods only in the most favourable situations. The hornbeam also is largely used for filling up in Scots fir woods, and for protecting the soil. Alder, too, is profitably cultivated in marshy places. According as the soil is loamy or sandy, so do we find the oak or Scots fir predominating. It is found that the timber of Scots fir grown on loam is much inferior in quality to that furnished by trees growing on sand, although, so far as yield is concerned, the former situation may produce more than the latter. At the age of 120 to 140 years, woods of Scots fir yield from 4300 to 4800 cubic feet of timber per acre (English measurement), which commands an average price of about 6½d. per cubic foot, though for wood of very fine quality 10d. or more is obtained. The oak forests take 200 to 240 years to reach maturity, and then they yield 2150 to 2500 cubic feet per acre, which sells for from 10d. to 1s. 1d. per cubic foot. The tendency in this district at present is to reduce the area under oak, and to increase that under Scots fir, for it is believed that although oak timber is getting scarcer, its price will not rise in proportion, owing to its being supplanted by iron and many foreign woods.

Leaving alder coppice aside, we have, in this district, to deal with three principal systems of sylviculture, namely—oak mixed with beech and Scots fir, Scots fir mixed with oak and beech, and pure woods of Scots fir.

1. Oak, with Beech and Scots Fir as a Mixture.—This mixture is managed according to the quality of the situation. On the best class of soils the object is to gradually remove the Scots firs and beeches in the thinnings, so that at the end of the rotation practically a pure oak wood remains. On poorer soils, on the other hand, the Scots firs are allowed to compete on equal terms with the oaks, while the beeches are kept under, and serve the purpose of a soil-protection wood. At the end of 120 years the Scots firs are felled, while the oaks are left for another period of 120 years, making the total length of the rotation 240 years. In some cases, also, the beeches are allowed to get up to the same height as the oaks and Scots firs, in which case the firs are removed at the end of 120 years, and the oaks and beeches at the age of 240 years.

This form of mixed wood is established in three different ways, according to the circumstances of the case. If both oaks and beeches are present at the end of the rotation, so-called "seed-fellings" are undertaken, and the regeneration takes place by means of self-sown seed. A few firs scattered up and down the wood will furnish a sufficient number of seedlings of this species, or, otherwise, young plants are brought from the nursery. During the period of regeneration, great care must be taken to protect the young oaks from being crowded out by the more vigorously-growing beeches and firs.

The second method of regenerating such a mixed wood occurs where oaks are very scarce at the end of a rotation, the bulk of the trees consisting of beeches and Scots firs. In such a case the wood is strongly thinned, and the oaks are introduced in rows or bands by means of acorns or two-year-old plants. The rest of the stocking is secured by the self-sown seed of the beeches and Scots firs. If, on the other hand, seed beeches are scarce, this species is also introduced by means of artificially sown seed.

The third case occurs where it is found that an area is so irregular in character that only certain small circumscribed portions are suitable for the growth of the oak. When this is the case, small patches—say 40 yards in diameter—of the old wood are cleared, and these are stocked, artificially or naturally, with oaks. After seven or eight years the adjoining portion is naturally regenerated by means of seed-fellings in the usual way.

2. **Scots Firs, with Oak and Beech as a Mixture.**—This sylvicultural system is practised on land which is only indifferently suited to the growth of oaks, as, for instance, where good strong soil is overlaid by five or six feet of light sand. The length of the rotation is here 120 years, at the end of which time 70 to 90 per cent. of the trees should be firs, and 10 to 30 per cent. oaks, the crowns of the beeches being all at a lower level, so that these trees are chiefly fulfilling the functions of a soil-protection wood. At the end of the rotation, a small number of the best-formed oaks and firs may be retained as standards to grow for some years longer.

In regenerating this form of wood, small areas, round or oblong, are cleared in the wood, and these are stocked with oaks and beeches, which are usually introduced as seed. When the trees on these regenerated patches have attained the age of ten to fifteen years, the adjoining wood is renewed by seed-fellings.

3. **Pure Scots Fir Woods.**—These are chiefly confined to the tracts of pure sand, the rotation extending to 120 years. Regeneration takes place by clear-felling narrow bands of the old trees 60 to 80 yards broad. The clearing begins on the east side of the

forest, so as to protect the old trees against being blown down by the violent west gales, and the denuded stripes run from north to south, in order that the ground may be preserved as much as possible from the drying influence of the sun. A new clearing is never undertaken till the last one is fully stocked and in vigorous growth, so that an interval of ten years usually elapses between two such fellings.

The ground is restocked by artificially sown seed (5¼ lbs. per acre), or by means of one-year-old seedlings which are placed in a furrow made by the forest plough, or are inserted in stripes that have been trenched to the depth of 12 inches. Whether sowing or planting will be adopted depends on the abundance of seed, or the abundance of hand labour, but, speaking generally, a surface free from weeds is restocked by sowing, and a grassy or weedy surface by planting. Blanks are filled up either by deeply stirring a patch a foot square and inserting a year-old seedling plant in each corner, or by using plants with balls of earth on their roots.

In the immediate neighbourhood of Eberswalde, the forest is managed on the uneven-aged selection system. There are two reasons for the adoption of this system—the first, the uninterrupted maintenance of the beauty of the woods, by avoiding the necessity of making clear-fellings; and the second, the providing of a system not common in the district, so that the students may have the opportunity of becoming familiar with it. The method of procedure is as follows:—Patches of a diameter of 30 to 50 yards, at intervals of about 80 yards, are cleared in the woods, and, having been surrounded by a deer-proof fence, these patches are partially stocked by beech seed sown in wide rows. Two years later the seed of the Scots fir is sown between the rows of beeches, and when the young trees are fairly established, a few of the old marginal trees are removed, and the patch under regeneration correspondingly enlarged.

At the instigation of Prince Bismarck, who was considerably influenced in the matter by Herr Booth, the Prussian Government has, since 1881, devoted much attention to the introduction of exotic trees. Up till 1885 attention was only given to American and European trees, but since then the Conifers of Japan have been largely experimented with. From 1881 to 1885 a sum of £2500 was annually voted for this work, while for the period 1886-90 the allowance was £1500 a year. During the ten years 1881-90, £12,500 was spent on the purchase of the seeds of exotic trees. In 1890 it was considered that enough had been done to give most of the likely exotics a chance to prove their value on Prussian soil, so that since then the annual vote has been only £350. During the experimental decade ending with 1890, the

following trees were dealt with:—*Pinus rigida**, *P. ponderosa*, *P. Jeffreyi*, *P. laricio*, *Pseudotsuga Douglasii**, *Abies Nordmanniana**, *Picea sitchensis**, *Cupressus Lawsoniana**, *Thuja Menziesii*, *Juniperus virginiana*, *Carya alba**, *C. amara**, *C. tomentosa*, *C. porcina*, *Juglans nigra**, *Acer californicum*, *A. sacharinum**, *A. dasycarpum*, *Fraxinus pubescens*, *Betula lenta**, *Quercus rubra*.[1] *Thuja Menziesii* would succeed very well but for the attack of a fungus (*Pestalozzia funerea*) which has brought all the plantations of this tree into a very critical condition. Since 1890 the following additional trees have been planted:—*Prunus serotina*, *Fraxinus alba*, *Pinus Banksiana*, *Picea pungens*, *Abies concolor*, *Larix leptolepsis*, *Chamæcyparis pisifera*, and *C. obtusa*.

Up to the present about 1730 acres of State Forest have been planted with exotics, which are under the control of the Central Investigation Station of Eberswalde. This is over and above numerous areas that have been stocked by means of seed got in other ways, so that practically no State Forests now exist in Prussia that do not contain a greater or less number of exotic trees. In the neighbourhood of Eberswalde exotics have been extensively tried, where it has been found that they thrive well in the cleared patches that are made in woods worked on the uneven-aged selection system.

In preparing the above account of the Sylviculture and Arboriculture of the districts visited by the Royal Scottish Arboricultural Society on its Excursion of 1895, I have, on behalf of the Society, to express my warmest thanks for assistance rendered by Herr Landesforstrath Quaet-Faslem of Hanover, Herr Forstmeister Hesse of the Saupark, Springe, Herr Regierungs- and Forstrath Betzhold of Hildesheim, Professor Schwappach of Eberswalde, and Messrs Heins of Halstenbeck. The Society is specially indebted to Professor Schwappach, who not only supplied the whole of the matter for Eberswalde and its neighbourhood, but who also secured the assistance of the other gentlemen named above. As all the above information dealing with State Forestry was derived from official sources, and is therefore thoroughly reliable, it constitutes evidence of the very greatest value in regard to the management and returns of Prussian forests.

For kind assistance with the translation, I have also to thank Professor I. Bayley Balfour and Dr Smith of the Royal Botanic Garden, Edinburgh, Mr A. C. Forbes, Bowood, Calne, and Mr Robert Ferrier of the Durham College of Science. W. S.

[1] The species that have succeeded best are indicated in the above list by a star.

BERLIN AND POTSDAM.[1]

4th August.

Berlin, the chief town of the German Empire, with a population of about 1,660,000, stands on the river Spree, about 100 miles due south from the Baltic Sea in the neighbourhood of Stettin, and 110 feet above sea-level. Situated nearly in the middle of the Empire, it is a centre of great commercial activity, as well as the seat of the Imperial Government, and the residence of the Emperor and his Court. Built in the midst of an extensive sandy plain, it suffers in picturesque beauty when compared with most other European capitals; but, nevertheless, it contains many busy and well-edificed streets, numerous handsome buildings, with spacious squares, parks, and open spaces skilfully laid out and well kept, which add much to the beauty and attractiveness of the city.

In Berlin the objects of most interest to arboriculturists are the public parks and gardens, the Unter den Linden, and the various museums of natural science and rural affairs. The chief public park, and the largest, is the celebrated Thiergarten. It lies on the west of Berlin, the main entrance from the city being the Brandenburg Gate, at the top of the Unter den Linden, and it extends about 2 miles west towards Charlottenburg, with an average breadth of half a mile, and a total area of over 600 acres. The surface is comparatively level, but it is well diversified with plantations, which exhibit the character of natural forest, and occupy about two-thirds of the space, while the remainder is devoted to formal avenues, neatly kept lawns and flower-gardens, and a series of lovely sheets of water, which add considerably to the beauty of the scene. Roads and walks traverse the park in every direction, so that all parts are easily reached and seen to the best advantage. The semi-natural style is rather pleasing at the first glance, but, to British tastes, soon becomes somewhat monotonous from the want of contrast and variety in the size and species of the trees and shrubs employed in the arboreal embellishments, and the dull sameness of the foliage and contour presented to the eye at every turn.

The famous Unter den Linden extends about a mile in length, from the Brandenburg Gate to the Royal Palace, with a width of about 200 feet, the centre of the street being adorned with several rows of lime trees, from which it derives its widely known name. It is one of the busiest streets in Europe, and the most fashionable promenade in Berlin; and when brilliantly lighted up at

[1] By Mr Dunn.

night it is a pleasing sight to see the multitude of people passing to and fro, or quietly sitting beneath the limes, every leaf and twig being clearly outlined by the brilliancy of the electric light. The lime trees in themselves are not remarkable for either size or beauty, the stir and dust amidst which they exist being against their luxuriant growth; still they present a tolerably thriving appearance, and afford a grateful shade and pleasant rendezvous to the fashionable crowds who congregate and promenade beneath them.

The Botanic Garden in Potsdamer Strasse, Zoological Garden on the south-west side of the Thiergarten, Humboldt's "Hain," or wood, in the northern, and Frederick's "Hain" in the eastern suburbs of the city, are all well worth a visit. The Agricultural Museum, containing probably the most extensive and complete collection in the world of agricultural specimens, implements, and appliances, stands in the Invaliden Strasse, near the Stettin Railway Station, and close to it are the Natural History and the Geological Museums, both full of objects of great interest to the arboriculturist.

Potsdam.

The town of Potsdam, with a population of 55,000, is built on an island of the same name in the river Havel, which in this neighbourhood expands into a series of large and beautiful lakes, amidst scenery of the most charming nature. In the vicinity of the town are numerous extensive parks and palaces, the residences of the past and present rulers of Germany and their families. In fact, the whole district may be said to be one magnificent Royal domain, extending for miles around Potsdam, and forming a richly diversified and picturesque landscape, in which beautiful trees and rich woodlands form a leading feature.

Distant about 16 miles south-west from Berlin, Potsdam is easily reached by several lines of railway. The plan for visiting the chief objects of interest in Potsdam had been carefully arranged by Mr John Booth, of Berlin, who courteously acted as *Cicerone* to the party. Leaving Berlin, the inspection began at New Babelsberg. In carriages the party first visited the Royal Park and Castle of Babelsberg, the summer residence of the Emperor William I., which stands at a considerable altitude in a beautifully-wooded domain, and commands extensive views of the most charming scenery of the district. The grounds were laid out by Prince Puckler in the British style of landscape gardening, and present an ever-varying and highly-attractive appearance, as they are maintained in the most perfect order. Deciduous trees and shrubs prevail in the composition, as the winters in this part of Prussia are too severe to permit of the free use of evergreens.

Driving across the valley to Klein Glienicke, the park and castle of Prince Frederick Leopold of Prussia, brother of the Emperor William I., were inspected by the special permission of His Royal Highness. The park and gardens are in the British style, and present many features of rare beauty. Charming views are obtained through delightful vistas of the broad waters of the Havel and the Jungfernsee, o'erhung by low hills wooded to their summits, with many palaces, castles, towers, and villages nestling in the sylvan landscape, or standing picturesquely on the shores of the lakes, and reflecting their shadows in the placid waters. In the pleasure-grounds are many rare and beautiful trees and shrubs, chiefly of deciduous species, which are found to thrive well in the high summer temperature, and are able to withstand the rigours of winter in this sheltered locality. Among them were noticed American and Japanese maples, hickories, oaks, and poplars; the almond, tulip-tree, catalpa, *Ailantus glandulosa*, *Pterocarya caucasica*, and magnolias of several species, scenting the air with the perfume of their flowers; and *Aristolochia Sipho*, with its striking foliage climbing to the top of the tallest trees.

Passing the newly-erected palace of a member of the Imperial family, situated on the northern shore of Glienicke lake amidst beautiful gardens and grounds, the road leads over Glienicke bridge. A long and interesting drive along the southern shore of the Jungfernsee, and, by special permission, through a portion of the Imperial Gardens, and past the Marble Palace on the Heiligen See; Potsdam was reached about noon, and a halt was called at Schloss Platz for an hour.

Among the most notable objects in the town were the "Schloss," or Royal Palace, built by Frederick the Great, to whom Potsdam and its neighbourhood mainly owe their characteristic features and historical fame. On the south of the palace is the Lustgarten (Pleasure Garden), with the spacious parade ground on which Frederick William I. used to drill his famous regiment of gigantic guards; on the east, the Barberini Palace, another of the palatial erections of Frederick the Great, and near it the Rathhaus, or City Hall; on the north, the chief ecclesiastical building in Potsdam, the Church of St Nicholas; and a little farther off, in Wilhelm Platz, a noted statue of Frederick William III. Beyond the square on the west, in Schloss Strasse, the Garrison Church was seen, where lie the remains of Frederick the Great and of his father, Frederick William I., the founder of the church. The interior walls are hung with military trophies, chiefly captured in the wars with France.

Leaving the town by the Brandenburg Gate, a visit was paid to the Friendenskirche (Church of Peace) and the beautiful Mausoleum erected by the Empress Victoria, Princess Royal of

Britain, in which rest the remains of her husband, the Emperor Frederick III. Passing on, the gardens and pleasure-grounds of Marly presented many charming features in the best style of landscape design, and were richly embellished with choice trees and shrubs, and a profusion of beautiful flowering plants.

Immediately beyond Marly, the far-famed Park and Gardens of Sans-Souci were entered near the main gate, at which stands the Great Obelisk. Sans-Souci owes its origin to Frederick the Great, who spent much of his time here in designing and building the palace, and in constructing the magnificent terraced gardens and extensive pleasure-grounds which lie around it, in nearly every style of landscape art. Approaching the palace through the winter garden, in which clipped hedges and formal banks of shrubs, with choice conifers from North-west America and Japan, are the most striking features, the Great Fountain is seen near the foot of the terraces, throwing its waters into the air to a height of fully a hundred feet. The way to the palace lies up the spacious flights of the grand stair, leading from terrace to terrace until the grand plateau in front of the palace is reached, at a height of about seventy feet above the basin of the Great Fountain. From this coign of vantage a glorious view is obtained of the magnificent panorama, with the Great Fountain in the foreground, and, as a whole, forming a masterpiece of landscape beauty.

The grand terraces, six in number, extend far to the right and left, and are richly decorated with ornamental piers, balustrades, vases, and statuary. The walls of the terraces are covered with narrow, old-fashioned glass-houses, in which peaches, figs, and other fruits and plants are cultivated; but these houses are much out of harmony with their surroundings, and add nothing to the interest or beauty of the scene. The flower-gardens are in the Italian style, and are richly decorated with handsome vases, statues, groups of sculpture, and fountains. Among the most striking embellishments are the large number of fine orange trees set in tubs, and the brilliantly coloured flowers and foliage which enliven the parterres.

To the right, on the way to the Northern Garden, or Pinetum, the famous Windmill is seen, which, says popular tradition, the owner doggedly refused to sell to Frederick the Great, but it has now long been Royal property. In the Northern Garden are specimens of all the coniferous family that will bear the rigours of a Prussian winter, with many fine examples of the best species and varieties. Turning to the left, the way was through the Sicilian Garden, richly embellished with rare and choice plants, statuary, vases, and fountains.

Proceeding southward through the richly wooded pleasure-

grounds and park, the Hauptweg, or Grand Avenue to the New Palace, was crossed, and the route lay through the spacious park, where many stately specimens of trees were seen standing singly on the greensward, or tastefully grouped in clumps and groves with charming effect. Passing the Sea-Horse Fountain, the Japanese House, the Roman Bath-House, and many other notable objects, Charlottenhof is reached, a handsome villa in the Italian style, standing in the midst of beautiful gardens and pleasure-grounds, in which the choicest kinds of conifers are an effective and pleasing feature. Here is preserved the celebrated chair made of steel and silver by Peter the Great of Russia.

Bearing to the right, the route passes the Hippodrome, now tastefully laid out with charming avenues, grass walks, and alleys; and on through a wide stretch of lovely park scenery till the New Palace is reached, standing on a fine site at the end of the Grand Avenue, which runs eastward for about a mile and a half to the Great Obelisk, at the main entrance to Sans-Souci. The prospect from the grand entrance, abutting on the spacious esplanade in front of the stately edifice, is extensive, beautifully varied, and harmonious. The palace was erected by Frederick the Great, at a cost, it is said, of £450,000, and is elaborately decorated with sculpture, statuary, and other works of art, while the interior contains two hundred apartments, many of them richly adorned, in a somewhat florid style of decorative art, and containing numerous celebrated paintings by the most famous masters. Among the largest and most attractive of the rooms are the Marble Saloon or Concert Room, the Theatre, and the Ball Room, each over 100 feet long and about 60 feet wide; and the gorgeous Shell Saloon, the walls, roof, and floor of which are richly inlaid with the rarest and most beautiful shells, precious stones, and minerals. The rooms formerly occupied by Frederick the Great remain intact, and contain many interesting relics of that distinguished monarch. The palace was the favourite residence of the late Emperor Frederick III., who died here in 1888; and is now occupied by the reigning Emperor, William II., and his family.

Returning through the Brandenburg suburb to the town, a glimpse was got, in passing the Royal castle, of the famous lime tree, now carefully protected, at which petitioners were wont to station themselves, in order to attract the attention of Frederick the Great. Crossing the Lange Brüche, or Long Bridge, a substantial stone erection, with artistic groups of statuary decorating the piers, beautiful views were obtained of the wide expanse of the Havel, dotted with umbrageous islands, and o'erhung by the sylvan heights of Brauhausberg in front,

and of the loftier Babelsberg away to the left. Passing out by the Teltowe Thor, the railway station was soon reached, and the visit to Potsdam ended. M. D.

THE NURSERY OF MESSRS HEINS AT HALSTENBECK.

5th August.

This nursery, which is situated a few miles from Hamburg, embraces about 125 acres. It furnishes every year about 100 waggon loads of plants, over and above a large number which are sent out in hampers and bundles, the total number despatched annually being approximately 40,000,000. The species of trees raised are in general those that are met with in Scottish nurseries, but of late years somewhat of a specialty has been made of the Douglas fir, Menzies spruce, and the Weymouth pine, which have been largely planted all over Germany, the last-mentioned tree being greatly in favour in Bavaria. The hawthorn is also raised in enormous quantities, the firm having the reputation of possessing a very fine strain of this plant. From fifty to sixty hands are regularly employed, but at times, when work is pressing, the number is increased to a hundred or more.

Close proximity to the railway enables the Messrs Heins to despatch the plants in very fine condition, most of the small Conifers being loaded straight into the trucks without previous packing. Hardwoods, and large trees generally, are made up into bundles by means of a special machine, and trees packed in this way are found to stand a long railway journey in an exceptionally satisfactory manner.

In spring, when sowing and transplanting operations are in full swing, a cold dry east wind prevails in this part of Prussia, which does great damage to young nursery-stock. In order to counteract the effects of this cold drying wind, Messrs Heins, two years ago, laid down a system of water-piping over a part of their nursery, the pressure being derived from a petroleum-engine of two-horse power. The results of the irrigation have been very satisfactory, the death-rate amongst the plants in spring having been greatly reduced. The nursery is thoroughly equipped with all the modern appliances for cultivating the ground, sowing, planting, and removing the stock, cleaning and storing of seeds, and for the general despatch of business.

XIV. *Some Aspects of the Excursion of the Royal Scottish Arboricultural Society to Germany, July–August* 1895.

By Andrew Slater, Haystoun, Peebles.

To those members of the Royal Scottish Arboricultural Society who were fortunate in being able to join the Excursion to the forests of Northern Germany, the opportunity was afforded of gaining much valuable information, not only in forestry, but also in agriculture as well. Those interested in municipal and county government were also able to draw valuable information from what was to be seen and learned in the various cities and districts visited, which might be beneficially applied at home.

In the cities and towns, advantage is taken of every available spot for the growth of trees, and these, along with the open spaces and gardens, which are freely utilised for arboreal and floral growth, combined with the general cleanliness of the surroundings, add to their attractiveness. Such vegetation seems to be religiously protected by the inhabitants, as in the busy thoroughfares it seems as perfect and undisturbed as could be found in any private domain in this country.

In forming streets of new buildings, among the first operations appears to be the planting of a line of deciduous trees on each side, these being chiefly limes, and, owing in a great measure to the absence of smoke during the summer season, they, when in leaf, look fresh and vigorous.

Country roads are treated in a like manner. Trees, frequently fruit, are planted at intervals along their margins, and while shading the traveller from the summer sun, yield heavy crops of fruit, which, owing to the forbearance of the public, come to full fruition.

The physical features of the provinces of Hanover, Brunswick, and Brandenburg which were passed through, may be characterised as a series of sandy plains interspersed with tracts of marsh and loam, and with slight undulations nowhere rising more than 1300 feet above sea-level, excepting the Harz mountains—the Brocken, which is 3747 feet, being the highest peak. These plains have, where possible, been rendered fertile by cultivation, and, as a rule, fairly luxuriant crops are reaped. They consist chiefly of rye, barley, oats, beans, beet, and hay; and adjoining or convenient to large towns considerable breadths of asparagus are grown. Cattle, owing probably to the absence of fences and the limited size of the holdings, are mostly all "soiled"

in-doors, and consist mainly of the Holstein breed. On the Harz, however, the cows, which belong chiefly to the woodmen and miners, are of a distinct class, brown in colour, of a size and make between the Ayrshire and shorthorn, and their appearance would indicate them to be fair milkers, and susceptible to easy fattening.

The roads being on the whole of a level character, the haulage is easy, and the horses, for that and other reasons, are light, and are usually worked in pairs in four-wheeled carts. Cows, however, are also used as draught animals, and dogs are frequently yoked in suitable vehicles, especially in towns.

Small holdings appear to be the rule, and are either owned or rented by the peasantry. The system of peasant proprietorship has, it is said, been found to work well, and it is the intention of the Government to extend the system as opportunity offers. Large estates are, where possible, bought up and divided into 50 to 70 acre holdings. These are taken up by the peasantry, who pay a fixed sum annually for the holding until its original cost, with interest, is paid off. With the view of preventing these holdings being subdivided among the families of deceased owners, it is enacted by statute that the eldest son becomes the inheritor. The houses of these peasants are usually in groups or villages, and their ground-floors, as a rule, are occupied by the families in one end, while in the other, on each side of an open passage leading to the living rooms, are located the live stock, the upper storeys being used for storing grain, fodder, etc.

The poor are treated very much in the same way as our own, but there are old-age pensions which tend to lessen the number of those in need of relief in their old age. Others again are assisted by the State in colonising sections of land provided for that purpose.

The climate of Germany is perhaps not so diversified as one might be led to expect, as the greater heats of the southern latitudes are modified by the hilly character of that part of the country, while the cold of the more northern plains is mitigated by their vicinity to the sea. The following figures give a comparison of the average annual temperatures of Germany, as taken at various stations, with those of the British Isles over the last twenty-nine years:—

	Summer.	Winter.	Average.	Rainfall.
Germany, . .	64°·66 F.	29° F.	46°·83	20 ins.
British Isles, .	54°·75 F.	42°·1 F.	48°·42	34·7 ins.

The question of wind-force has an important bearing on forestry

in all countries, and it would have been of interest had information been obtainable in that respect. It, however, appears, owing to the imperfect instruments at present in use, that no reliable data can be obtained as to the velocity of severe storms of wind, such as, during late years, we have experienced. No doubt other countries are liable to be visited in a similar way, and Germany, it appears, is no exception to the rule, as was evident by the photographs noticed in the Academy at Eberswalde, showing the devastating effects of such storms on her woodlands.[1]

The various states of Germany interest themselves in furthering and encouraging agriculture, by means of colleges, experimental stations, and otherwise. In a like manner, equal attention is paid to forestry, as is apparent from the highly equipped academies maintained in suitable centres for its teaching, and for investigations and experiments in connection therewith. Take for instance that at Eberswalde, which is equipped with a Director and nine Professors. The Academy itself is a three-storeyed brick building, the lower flat containing a reading-room, a chemistry and mineralogy lecture-room, a chemical laboratory, an experimental workroom, chemical and geological collections, weighing-room, geological museum, etc. The second flat contains lecture-room, forestry and chase museums, geological and physical collections, meteorological workroom, etc. On the third floor are lecture-rooms, workrooms, room for drawing, botanical and zoological museums, etc. These collections of geological, mineralogical, botanical, and other specimens are highly instructive and interesting, and the same may be said of the models of forest machinery, tools, timber-slides, etc., as well as those demonstrating the various uses to which the produce of the forest may be applied. With the addition of experimental nurseries, and the surrounding forests, the students of such academies have every opportunity of being thoroughly trained in everything connected with forestry.

A duty, and an important one, that devolves upon the representatives of a nation, is that of developing its various resources. Where, therefore, land unfit for profitable agriculture exists, but which might, by systematic afforestation be utilised, they cannot,

[1] On 12th and 13th March 1876, about 30 million cubic feet of timber were blown down in the State and communal forests of Hesse, or 84 cubic feet per acre; and the same storm cleared 24 cubic feet in the Saxon forests, or 40 per cent. of their fixed annual yield.

On the 1st August 1877, a whirlwind, fifty miles to the north of Berlin, destroyed 3½ million cubic feet of standing timber over a breadth of 2½ miles. See Schlich's "Manual of Forestry," vol. iv., p. 466.

or at least ought not, to lose sight of the fact that they fail in their duty, if advantage is not taken of that method of increasing the revenue of the nation, and at the same time of affording a means of employment to many who, where such land exists, eke out but a precarious livelihood otherwise.

Such a charge cannot be laid against Germany, for not only has she elevated forestry to the rank of a science, but she practises what she teaches, with the result that what might be called the waste places of the empire are being gradually afforested, and she can show what excellence the growth of timber, under scientific and systematic management, on inferior soils, can be attained, with profit to the State, and a means of livelihood to a large section of the community. Doubtless there are other countries that have become alive to the necessity of protecting and extending their forests, and are following in her footsteps; but, whether through lack of forethought or through carelessness, certain nations, which are dependent on others for the bulk of their supply of timber, all but ignore the necessity of encouraging and fostering forestry, with the view of utilising the waste lands within their borders. It may be said that drawbacks exist which act as a hindrance to decided action being taken, but such can be surmounted, not, perhaps, by costly commissions, but by following the dictates of common prudence. No better object-lesson to those desirous of taking advantage of what might be considered next to worthless land, could be afforded than that which was witnessed at the forest of Oerrel, near Lintzel, in the province of Hanover, where the province has procured by purchase a large tract of the Lüneburg heath for afforestation. As opportunity offers that area is increased, and by the aid of the Special Loan Fund,[1] which is elsewhere noticed, associations, communities, and private individuals are following the example which the State has placed before them in afforesting similar land. This land, where ploughing operations were in progress, had a thin covering of heather, with a surface-layer of about six inches of sandy peat, the subsoil underneath being a dry, fine yellowish sand. A pair of Fowler's engines were at work with a large plough, turning over about 18 acres per day to an average depth of 20 inches, at a cost to the province of 20*s.* per acre. Such operations on this class of land might be viewed by some as burdening the initial cost of formation with unnecessary expense. It may,

[1] See "Short Account of the State Forests of Prussia," page 140.

however, be pointed out, to show the justification for that procedure, that the surface, or partly organic layer, is turned down and incorporated with the inorganic one beneath, which will thus assist in promoting a more vigorous growth in future years than would be possible if the ground were left undisturbed. Another advantage is also gained, in that seeding can be resorted to instead of planting, or smaller plants can be used than would otherwise be necessary on an unbroken surface. As a matter of fact, after the ground is harrowed, 80 per cent. is planted with one-year seedlings and the balance sown with seed. Scots fir is the principal crop, but, where the soil is suitable, oak is sown along with a sprinkling of Scots fir, the fir being introduced to form nurses for the oaks; and when they have served that purpose, the former are cut out, tied up into bundles, and sold as fascines for protecting river banks. Before planting or seeding takes place, the ground is divided into rectangular blocks, each having a distinct number, by broad rides or roads which diverge into a main thoroughfare. A strip of oak mixed with birch is planted round the margin of each block, as a wind-break and for protection against fire. There are about 1000 acres laid down here annually under a forest crop, and the existing one, at the present moment, varies from one up to seventeen years of age. The trees are, on the whole, healthy and vigorous, but damage to some of the leading shoots of the Scots fir was apparent, caused probably by the larvæ of the pine shoot *Tortrix* moth. The bulk of such woods in this country would have been freely thinned ere this, but that operation is not likely to be instituted with those under review until their principal height-growth is attained, which will be, in the case of the older sections, in the course of probably ten or a dozen years, and the thinning will be prosecuted sparingly every five or eight years thereafter. By such means, tall clean-grown timber, such as was afterwards seen, is obtained.

It may be as well, before proceeding further, to briefly sketch some of the methods adopted by the German foresters in raising and planting out their plants.

For supplying plants for such operations as have just been noticed, a considerable breadth of nursery ground has been laid out, convenient to the scene of operations, and that was stocked with the various kinds of plants likely to be required. In other districts where planting, either after clear felling or otherwise, is to take place, patches of 30 or 40 yards square are cleared

of timber in a suitable and convenient position within the forest. The roots are then grubbed out, the ground trenched and laid out in beds three feet wide with alleys between. The seeds are usually sown in rows across the beds, and covered with specially prepared soil, and afterwards their surface is covered with a thin layer of spruce leaves, or with well-decomposed leaf-mould, to prevent too rapid radiation. As a protection against frost, they are then covered with spruce branches, over which may be placed a thin layer of grass, but after all danger is past the covering is removed. In transplanting seedlings into the nursery rows, great care is observed in placing their roots as far as possible in their natural position, and in giving the plants sufficient room for development. Two crops are usually produced from these temporary nurseries, and advantage is at once taken of introducing the future forest crop, by planting in each alley, as soon as formed, a row of trees two to three feet apart. An advantage is thus gained of four or five years' growth, which would otherwise be lost if the planting of the area was postponed until the final crop was removed.

As it is with nursery work, so it is in planting outside. Everything that has a tendency to further the success of the operation is carefully attended to and methodically carried out. In planting sandy soils, where Scots fir is to be the crop, one year's seedlings are generally used, and for these the surface is previously stirred, either with the plough or spade. For planting, a broad wedge-shaped spade is used, which is pressed by the workman down into the soil, and a wedge-shaped opening formed. A woman or boy is at hand, who carries the plants in a basket, and who has also a dish of water convenient, into which the roots of a couple of plants are dipped, and these are then sprinkled over with a little fine soil. One is held, with its roots perpendicular, in each end of the opening, and the spade is then sunk about three inches back, but parallel with the opening, and the soil pressed forward against the roots. The whole then receives a gentle tramp, when the work is completed.

Where the surface and soil are of a rougher character, as, for instance, on the Harz, larger plants become necessary, and are placed about three feet apart, the surface sod at the position of each plant being pared off by a light mattock, and the subsoil loosened. The planters (women) scrape out a hollow with their hands and place the plant *in situ*, and cover its roots with a couple

of handfuls of prepared soil, which is pressed firmly down. The ordinary soil is then drawn round the neck of the plant, and the whole firmed by a pressure of the foot. The prepared soil just referred to consists of a mixture of humus soil and the ashes of sods burned at a low temperature, and this is deposited in heaps, until required, at various intervals all over the ground.

Although it was expected that something phenomenal in the way of timber-growing would be seen, no little surprise was felt at the magnificent, tall, clean-grown, and full-wooded stuff that was everywhere invariably met with; not on the whole of great diameter, but of fine commercial quality. The taper on each bole, whether of hardwood, pine, or spruce, was slight, and the texture of the coniferous timber, owing to the equal and dense character of the annual growths, testified to its quality. The hardwoods, *e.g.*, oak, such as could be examined, were perhaps not so dense or tough in texture as those grown in open situations in this country, but very similar to what is imported from abroad. Beech, however, after thinning had taken place, showed fairly broad and equal rings, such as go, among hardwoods, to make timber of the best quality. The appearance of the ash, when growing, led one to form a similar opinion regarding it.

The sylvicultural principles, and the systems of management obtaining in the districts which were visited, are typical, it was understood, of those practised throughout Germany, and might, with modifications, be advantageously adopted in this country. Indeed, it may be said that until proprietors and others lay down systematic working plans, based on similar sylvicultural principles and methods of working, for the management of their woodlands, the results will, as by the past and present haphazard methods, be anything but encouraging or satisfactory. There are certainly drawbacks existing here, affecting financial results, which do not obtain in Germany, but these are within control and can easily be removed. That being so, there is no reason, so far as soil and climate are concerned, why timber of as good quality, and with equal results financially, should not be grown here as on the Continent.

The most important consideration in the formation of woodland crops is the selection of species that will produce a maximum of timber of the best quality. A soil that may be of the first quality in a particular situation for one species, may prove only of a second or third quality for a different one. For example, a soil of the

first quality for the Scots pine would be very much lower in the scale for the oak, and *vice versa*. It will thus be seen that soils are classed, apart from their general constitution, according to their situation and capacity for producing to perfection or otherwise one or more species of tree. The choice for one soil, therefore, may be limited to a single variety which would produce the desired result, and it would therefore be necessary to form a pure crop of it alone. Other soils, again, are capable of meeting the requirements of a variety of species, and it is here that some difficulty arises as to whether one or more should be chosen to form the crop. Probably in one locality it might be desirable, for financial reasons, to fix upon a pure crop, while in another, for a similar reason, a mixed one would be favoured.

If one is to judge by the appearance of the crops, the German foresters seem to thoroughly understand this question, and to adapt the crop to the soil, and, unless something unforeseen occurs, each crop is of similar composition to its predecessor.

On the Harz, pure woods of spruce form the prevailing crop, up to an elevation of 3300 feet. Above that level the ground becomes peaty and swampy, and the trees thinly scattered and stunted, and attain only the form of bushes. The greatest portion of the forest area is worked on the even-aged high forest system, with a rotation of 120 years. At the end of the rotation the trees stand about 220 to the acre, and average something like 30 cubic feet each of clean measurable timber. Under this system, when clearing is commenced, a strip 30 to 40 yards in width, but which may be of any length, is cut on the east side, and each successive felling is made against the prevailing west wind. As felling is done in winter, the trees are cut level with the surface of the snow. Clearing, however, may start, simultaneously or in successive years, in the same way at various points about 1000 yards apart, so as to accelerate the work of regeneration, and at the same time obviate the denuding of too large an area in any part at one time, which would tend to deteriorate the soil by exposure to drying winds, and thus interfere with the growth of the young trees used in restocking the cleared section. When the wood, including top-wood, is removed from the ground, the roots are grubbed up and split into firewood. The sum realised for the firewood obtained by this operation is about two-thirds less than the cost, but that apparent loss is counterbalanced by the absence of beetles, which would prey on the young plants used in restocking the cleared

ground if the old stools were left to form a harbour in which they would multiply and spread. In the course of three or four years after clearing, the ground is planted with six-inch spruce plants, three feet or so apart, and frequently in bunches of three or four in each. The system of bunch-planting has been adopted in districts frequented by browsing animals, so that if most of the leading shoots are nibbled, one, at least, may chance to escape. Another advantage is, that in wide planting the side branches are suppressed at an earlier stage than would be the case if plants were put in singly, and thus clean stems free from large knots are produced. On the other hand, when all but one stem are cut away, decay is apt to spread from the decomposing roots into those of the tree that has been left, and there is thus a tendency for the latter to be affected with rot in the stem. As the stem enlarges and presses, or grows into the stumps of those cut away before they have decayed, an abrasion at the base of the stem is likely to be caused which might tend to generate heart-rot, or at any rate cause a defect in the timber. Upon the whole, it is a system not to be recommended, and it is one gradually losing favour with those who have practised it.

On the higher limits of the Harz, where it is necessary to protect the soil from winds and from being washed away by rains, melted snow, etc., no clear felling is practised, but the selection system of working is adopted. The procedure is, where the area is divided into blocks, to cut out diseased, dead, or dying trees, and such others as may have become matured, periodically in each.

In the spaces formed by these removals, a portion of the surface is broken up so as to form a suitable seed-bed for seed falling from adjacent trees, or failing that, for artificially-sown seed, or otherwise for transplants that may be used instead. The growth of these, owing to the necessarily narrow limits in which they exist, will be restricted, and it is therefore necessary to partially open up, by thinning those surrounding the plot, in order to stimulate their growth.

The uneven-aged selection system, which is practically the same as that just noticed, is worked at a lower elevation, and is typical of the primeval forest growth. That is to say, when matured or diseased trees are removed, others, either naturally or artificially introduced, spring up, and as trees of all ages cover the ground, an uneven-aged wood is the result. Owing to soil,

elevation, and other considerations, which operate against free growth, the outturn of timber is decidedly lower than that obtained by the even-aged high forest system.

As a rule, spruce, as well as other woods, receive no thinning until about the thirtieth year after their formation. It will, however, be understood that on favourable situations it may take place earlier, and on unfavourable somewhat later. The first thinning is generally a light one, but it is repeated every fifth or sixth year until the end of the rotation. By that means the trees, as may be imagined, are, when thinning begins, tall and spindly, and probably not a third of the size of those of a similar age in this country. After thinning, the stems lay on an enhanced increment, which is stimulated by each of these operations, and in order to prevent soil exhaustion, the overhead canopy is, as far as possible, kept unbroken. As has already been remarked, tall clean trunks with little taper are the result. Such timber finds a ready market, and is used for structural, pulping, and mining purposes, there being numerous mines and pulp-mills in the vicinity of the forest. The latter manufacture the pulp by a purely mechanical process, and in the form of cardboard large quantities of it are annually imported to this country, the price received by the manufacturers being at the rate of £8 per ton.

The woods, on the whole, are comparatively free from disease, but considerable damage to their stems is occasioned by the deer, either by nibbling with their teeth or tearing the bark with their horns. Perhaps the fumes from smelting-works that are situated in the forest do greater damage to vegetation than all other agencies combined. Near Altenau a large area, which at one time was covered with thriving spruce woods, is now quite depleted owing to this cause. During the process of smelting silver, copper, and lead, which are combined in the form of sulphides, sulphur dioxide is given off in large quantities, and here, as well as in other districts where such works are located, it has, during the last fifty or sixty years, proved extremely hurtful to tree growth. Efforts have been made to convert that gas into sulphuric acid, and so retain it, but only with slight success, so that the fumes given off are practically as injurious as in their original form.

Large masses of Scots pine have usually a rather sombre appearance, but those on the German plains, as viewed from an elevated position, contrasted favourably with the lighter greenery

of pasture and meadow, and the rich yellow of the ripened corn, and tended to relieve the monotony attaching to a level tract of country. The Scots pine seems to find a congenial home on the poorer soils of these plains, as it occupies large areas, sometimes wide apart, sometimes c'oser together, thus showing the varying quality of the soil to be met with—the pine occupying land unfit for agriculture. The bulk of these pine woods, where pure, are worked on the even-aged high forest system, but occasionally with standards, as well as with a soil-protection wood. Young Scots pine woods are slightly thinned for the first time at the age of twenty-five to thirty years, and every fifth or sixth year thereafter. The young wood, up to a certain stage, will in itself improve and protect the soil, but after being opened up by thinning it will cease to act in this way; and in order that the soil may not be reduced in quality at the end of the rotation, a soil-protection wood is frequently introduced. That takes place when the wood reaches the age of sixty or seventy years, and is usually of beech or hornbeam, the former being the most common. Seeding is generally adopted, the ground being prepared according to its condition, either by hoeing or digging patches a couple of feet wide, at two or three feet intervals, over the area to be stocked. The seeds are sown in these, and as a rule a good undergrowth springs up, which succeeds wonderfully under the shade of the firs. The rotation of the Scots pine ranges from eighty years on low-class soils to one hundred and twenty years on the higher class, and strips of eighty yards or so in width are cut from north to south on the east or lee side of the wood. After the roots are extracted, and the ground prepared by ploughing, harrowing, or otherwise, an insect trap is made round the section in the form of a narrow trench about six inches wide by nine inches deep, with perpendicular sides, and at intervals of about ten yards, openings are formed in the bottom, as a pitfall into which the beetles drop as they move along the trench in their endeavour to escape. This, as was evident by the numerous insects seen in these openings, proves a most effective method of excluding them from the cleared ground. The restocking is either by seeding or planting, but in either case no further fellings are made in the neighbourhood until the young growth has been fairly established, when another section adjoining is taken in hand. For the purpose of obtaining timber of a large size, a few selected trees per acre are left as standards over another rotation.

These do not to any extent affect the growth beneath, as their tops are light and well elevated.

Scots fir mixed with oak or beech are managed according to the class of the locality. Where the overlying soil is more suitable for fir than for the others, but where that underneath is of a better quality, this mixture is sometimes adopted. At the end of the rotation of 120 years, about 80 per cent. of the wood is composed of fir, and the balance of oak, with a soil-protection wood of beech. When beech takes the place of oak, the relative percentages are the same. Such a mixture, one hundred years of age, was noticed near Eberswalde, the cubic contents of which per acre, beech and fir combined, amounted to 6130 feet quarter-girth measure.

Another mixture obtains on soils of a better class, consisting of oak, beech, and Scots fir. The Scots fir and beech are gradually thinned out, so that at the end of the rotation the oak only occupies the ground. Where the soil is of a lower quality, the oaks and firs exist as the overwood, while the beeches act as a soil-protection wood. At the end of the rotation the firs are removed, and the oaks remain for another period of 120 years. At the same time, it may be necessary, so that the ground may be fully stocked, to allow part of the beech to move up along with the oaks, and with them complete the final rotation of 240 years. These woods are regenerated in various ways, but the method of working is chiefly by the "group system." Small sections of a convenient form are cleared, and these are restocked either by seeds or transplants, and when they are fairly stocked and established, other sections are taken in hand, and treated in a like way, until the whole wood is gone over. Again, where oak and beech occupy the ground at the end of a rotation, they are strongly thinned, so as to induce seed-bearing. When that is attained, and a seed year comes round, the soil is prepared by hoeing or harrowing for the reception of the seed, and if a good stocking has resulted, nothing more is required, but if patchy, then seed may be artificially introduced, or plants removed from the stocked ground are inserted instead. Particular care has to be taken after regeneration that those plants of a vigorous habit do not choke out their neighbours, and that the parent trees are not removed until the young growth is out of danger from frosts.

When a pure oak wood, which is usually under-planted with beech, falls to be naturally regenerated, the latter, with a few

exceptions, are first removed, and then the oaks are reduced to about sixty per acre. When a seed year is apparent, the ground is prepared for the reception of the seed, the roots having been extracted previously. A few years later the oaks are reduced to forty, and the remaining beeches are removed, and six years later the whole of the oaks. By that method a good stocking is generally obtained.

Beech woods are generally worked on a rotation of 120 years, and on a soil of the first quality reach a height of over 100 feet, with a volume which sometimes approaches 9000 feet of measurable timber, or 13,000 feet, including top-wood, per acre. Until about the age of eighty years these woods are kept pretty dense. Afterwards freer thinnings are instituted, until about the hundredth year, when the so-called seed-felling takes place, to admit of the surface mould being, by greater exposure, sufficiently decomposed for seed germination, and to place the crop in a condition for bearing seed. If the surface is free from vegetation, and of an open character, no artificial preparation is necessary in a seed year; if otherwise, it may have to be scarified by harrowing, so that a suitable seed-bed may be formed. Everything being favourable, a good stocking is generally obtained with the first seeding, but if imperfect, the next occurring seed year, which is usually three or four years later, has to be taken advantage of. When the ground is fully stocked, and the young plants out of danger from frosts, the whole of the matured timber is cleared off, unless, as is frequently the case, a few selected trees per acre are left for another rotation, with the view of producing a heavy class of timber. In order to vary the crop, elm and other hardwoods are sometimes artificially added. It occasionally happens that the overhead canopy is opened up by windfalls, so that grass and other herbage covers the ground, and thus makes it impossible, unless at considerable trouble and expense, to secure a good seed-bed, and afterwards keep the seedlings from being choked by herbage. In such a case, if the canopy has not been too much interrupted, the trees are allowed to remain until they have again formed a close canopy, and the herbage, in consequence, has been killed out.

During the last fourteen years the Prussian Government have annually voted considerable sums for the introduction of exotics, and, with the view of testing their qualities under sylvicultural conditions, they have been introduced into most of the

State forests throughout the country. The system in which they have been introduced is chiefly in strips in uneven-aged woods. That is to say, a strip 50 to 60 yards wide is cleared in the inside of a wood, and after the necessary preparation of the ground, the exotics are put in in the ordinary way, and with the usual degree of density, probably two to three feet apart, according to the size of the transplants. Each species, as a rule, is kept in sections by itself, and is treated as ordinary forest growth. Their commercial qualities as timber under ordinary sylvicultural treatment will thus be ultimately fairly demonstrated. Those that appeared to be of a promising character were *Pseudotsuga Douglasii*, *Picea sitchensis*, *Betula lenta*, *Prunus serotina*, and *Larix leptolepsis*.

It may not now be out of place to bring some of the hints that may be gathered from the foregoing pages to bear on British Forestry, so that those desirous of seeing a better system introduced may find no difficulty in their application.

The results financially and otherwise of afforestation works depend on their initial cost, the adaptation of the plants to the soil, the manner in which the operations have been conducted, and the subsequent management of the growth obtained. Whether any improvement in our methods of afforestation or regeneration is desirable, is a matter on which opinions may differ, but there can be no difference of opinion on the necessity, especially with purely sylvicultural crops, that the burdens in connection with the initial cost should be as light as possible. Fencing is, of course, one of those burdens which is inevitable, and when it has to be of a vermin-proof character the burden is a serious one. If such expense, therefore, is necessary, the cost should be charged against the department which causes the necessity, and not form an addition to the cost of formation of the woods. In these respects such cost in regard to Prussian forests does not apply, as little or no fencing is necessary.

As to the matter of plants, the forester should, perhaps, rely more than hitherto upon his own resources for raising and maintaining the necessary supply; and where circumstances are favourable, or where they could be made so at a moderate outlay, seeding could be adopted instead of planting, so that fewer nursery plants would be required. The question of preparing the ground, either for stocking with plants or with seeds, should receive greater attention. In afforesting fresh ground with a tough, compact surface, or where a strong vegetation exists, it

seems desirable that the surface shou'd be skim-ploughed, and the subsoil stirred or treated in some other way, so that small seedlings instead of large transplants could be used. The difference between the price of seedlings and of transplants would go a considerable way towards covering the cost of preparing the ground; and the plants, although they might not make the same rate of progress at the outset as transplants, would have the advantage, if carefully inserted, of having their root-system naturally disposed in the soil, thus tending to their future stability. Their stems would also be more erect, and there would thus be fewer bent butts than is frequently the case in plantations where large transplants had been used. Seeding would be attended with similar advantages, and could be adopted on soils of a friable nature, where no difficulty would be likely to arise in forming a suitable seed-bed, and where the herbage would not be likely to prove troublesome afterwards.

In regenerations after clear felling, although the extraction of the roots seems desirable, owing to the expense of the operation it would have to be abandoned unless they could be marketed to some advantage. In any case, precautions should be taken against the attack of insects; and where a clean surface, owing to a dense canopy having been maintained, obtains, it could be scarified either for the reception of seeds or of one-year-old pine seedlings. Where the surface had become covered with herbage, either larger plants would require to be used, or patches of the surface skinned off with a mattock, and the subsoil slackened, and seedlings inserted. Unless the conditions are very favourable, natural regeneration, except, perhaps, in the case of the birch and beech, is not a system that has many advantages, owing to the necessary delay in awaiting seed years, and the generally imperfect stockings, as well as the slow progress made by the young growth in its early stages.

It seems desirable for the production of close-grained clean timber, and to assist the productive capacity of the soil, that the young crop should form close canopy at an early stage of its existence. To obtain that object, close planting in the absence of seeding should be adopted. Experience, therefore, would point to the necessity of planting seedlings about 2 feet to not wider than 3 feet, and in the case of transplants not wider than 3½ feet.

The desirability need hardly be pointed out of dividing large areas into sections or blocks of a rectangular or other convenient

form, and surrounding these with wind-breaks of a suitable width —with trees of a wind-resisting character, which would also serve as a protection against fire. The latter is essential, especially along the sides of railway lines, where the sparks from passing engines are liable to fire the adjoining woods. A precaution adopted in Germany against fire from that cause is to plough a strip about 9 feet in width annually along each side of the rails or on the top of the embankment, so that no herbage exists to lead the fire into the adjoining timber. For future convenience and guidance, these sections should each have a stone block erected at a suitable point, with a number, the acreage, and date of planting cut into it. Particulars of each should also be kept in the forest register.

It may be confidently asserted that nothing has contributed, to a greater extent in Britain, to the production of inferior and in many cases unsaleable timber, than our methods of thinning. These need not be recapitulated, further than to point out that the effect is to produce coarse, knotty, uneven-zoned wood, which, as compared with that grown in Germany, would be considered, with few exceptions, of a very inferior class indeed.

When young woods are freely opened up by thinning, the branches become unduly developed at the expense of the stems. It is therefore necessary, to obtain these of a tall clean character, to preserve density in the crop, so far as that is consistent with its health and vigour, so that the side branches may be suppressed before they become strong enough to form large knots in the timber, and that the ground may be shaded to prevent surface growth, and generally to maintain the productiveness of the soil.

Whether it is desirable to delay thinning until the twenty-fifth or thirtieth year or later, as is the case in Germany, where the results, as was evident, fully justified that procedure, is a question that must be solved by wider experience. There is, however, no doubt about the necessity of maintaining such a density during the principal height-growth of the crop, that the ultimate yield of timber may be proportionate to the capacity of the soil, and be of a tall, clean, and full-wooded character. Where the overhead covering, in the later stages of thinning, becomes broken, it seems desirable, as for instance with Scots fir, to introduce a soil-protection wood. Financial considerations may operate against that course, but where the soil has been well shaded previously, the operation would be attended with small expense.

Where large areas, after clear felling, fall to be regenerated,

the soil becomes deteriorated, owing to exposure to the effects of the sun, winds, and other agencies, and the successful regeneration is frequently attended with anything but satisfaction. By adopting the system of felling in strips, and regenerating these under the shelter of the adjoining wood, the soil is protected from drying winds, and to a certain extent from the rays of the sun, so that radiation is reduced, and the young plants are not so liable as when fully exposed, to be injured by frosts. The effects of shelter, apart from these considerations, upon the growing stock, is a more vigorous growth, which tends to an early formation of canopy.

On areas, owing to æsthetic or other considerations, where it is desirable to retain continuously a sylvan crop, the uneven-aged selection system may be adopted with advantage. By doing so, a full stocking is kept up, and a regular yield of timber realised.

In plantations kept up for ornament, large trees, owing to age, frequently become comparatively useless, and as the result of deaths and windfalls, the ground becomes imperfectly stocked. In such a case, and where otherwise applicable, the foregoing or the group system could be adopted, in order that the ground might be fully utilised, its ornamental character preserved, if not improved, and an outturn of useful timber obtained.

Working plans for the future administration of woodland estates should, after mature deliberation, be formed and systematically carried out, in order that a continuity of management may be observed, although the administrators be changed.

In this paper the object has been to leave out all superfluous matter, and deal only with what might be of use to those who take an interest in forestry, and it is hoped that the object for which it was written may have that result.

XV. *Report on the Excursion of the Royal Scottish Arboricultural Society to Germany in July and August* 1895. By DONALD ROBERTSON, Forester, Novar.

This Excursion was proposed by Mr Munro Ferguson of Raith and Novar, and was very ably carried through by Professors Somerville and Schwappach, both of whom deserve the thanks of all those who attended it.

The punctuality and strict adherence to the programme which characterised the whole trip were practical lessons which we, as individuals and as a Society, ought to try and imitate as much as possible during our future excursions. This will not be so easily accomplished at home as in Germany, especially if we have much railway travelling, because, although some of our trains at home run faster than the trains in Germany, the German trains are at the journey's end to a minute, whereas our trains are very often from ten minutes to two hours late.

Leaving Leith on the 26th of July, we experienced rather rough weather during the first part of our voyage. We arrived at Bremen on the afternoon of Sunday, the 28th July, and had a ramble through the town. In Bremen and in all the towns and villages which we visited in Germany, we found trees growing in many of the principal streets and promenades, the buildings very neat and tastefully got up, the people very clean and polite, and no appearance of drunkenness, although there appeared to be large quantities of light beers and wines consumed. Perhaps it would be too much to ask a Scotchman at home to drink anything so light as the Germans do, but the writer thinks that it would add very much to our pleasure and comfort if we had more trees in our towns and villages in Scotland and England.

On the 29th of July we began our tour of inspection at the Agricultural Station of Bremen, where we saw samples of what can be grown on pure peat land with dressings of potash and lime. Large tracts of peaty land in the neighbourhood of Bremen have been reclaimed and put under cultivation by the unemployed, and yield fair crops. The experimental station, which is upheld at the joint expense of the Government and the town of Bremen, must be of immense value to the cultivators of the land in the neighbourhood, seeing they can find out, by means of the experiments carried on there, exactly the kind and quantity of any substance

their land requires that it may produce the best crop. Our farmers at home would be very much benefited by such institutions to enable them to ascertain what their land requires in order to grow the different crops to the best advantage, and thus be the means of preventing them from spending money uselessly, as they doubtless in some instances do, in applying to their land a substance which it really does not require, or in giving more than is necessary of any particular dressing.

We then visited the State Forest of Lintzel. This is an object-lesson which our Government might copy with advantage. The State has purchased a large extent of moorland, and has already planted over 11,000 acres, and operations are still going on. But the State has not merely engaged in planting operations on its own account, it has also adopted measures to encourage private owners of waste lands to plant. A fund has been created from which private owners of land can borrow money at a low rate of interest for the purpose of planting; the only condition being that the management of the woods shall be subject to the approval of the State Forestry officials until the money is repaid. By this means, we were told, over 16,000 acres of moorland have been put under trees.

In the Government plantations several methods of sowing and planting have been tried. In all cases the land has been ploughed to a depth of from 16 to 24 inches, the light sandy nature of the soil being very well adapted for such culture. In some cases they plough the whole surface, and in other cases they plough only strips 8½ feet wide, leaving 4½ feet unploughed between the ploughed strips. We could not see that there was any necessity for ploughing, as there was very little appearance of "pan" where the ploughs were at work. The turning up of the light sandy land would make the soil liable to be very easily dried up to a considerable depth during a dry season, and would thereby cause a large percentage of deaths among the plants or seedlings. Our opinion was that the greater bulk of the land could have been planted by the Scotch notch or T system, and would eventually have produced as good timber, with fewer deaths among the young plants, and at a very much less cost. If that system had been adopted, the surface herbage would have prevented the soil from being so severely dried up during the summer months as it would be after having been ploughed. We were more confirmed in this opinion after having seen several very thriving seedlings growing upon

some of the drives near the older portions of the plantations, and these drives, we were told, had not been ploughed. In any case, ploughing could not be performed upon any great extent of moor-land in Scotland, the steep and rocky nature of our hill-sides in nearly all cases entirely precluding the use of the plough; but where it could be used upon land having pan, it would be a decided advantage to do so. The ploughing, as performed by the Germans, costs them about 20s. per acre.

The plantations are laid out in sections of about 30 acres, having a ride of from 16 to 24 feet wide surrounding each section. A strip of about 18 feet on both sides of the ride is planted with birch and oak, the remainder of the section being planted with Scots fir, and, on the better class of soil, with oak. It costs about 46s. to plant an acre with two-year seedlings of fir and spruce, and about 43s. to sow an acre with seed. The greater extent has been planted, only some 20 per cent. having been sown.

We consider the idea of bordering the sections with birch and oak as a protection against fire a capital plan; and we noticed that where railways passed a wooded area, a pretty wide belt of birch was planted along their sides as a protection against fire.

It struck us that the belts of birch at Lintzel, and, in some cases, along the sides of the railway, were too narrow to prevent fire passing through them; but when one considers the flat nature of the ground, we can believe the belts are sufficient. We think that such belts running across the line of prevailing winds would be a great protection against wind as well as fire in some of our large Scots fir plantations in Scotland; but, to be of service, such belts would require to be 40 to 50 yards wide.

We have generally seen, wherever a fire occurs in a wood, that if there is a rise in the ground, such as a hill-side, the fire makes its way up the hill much faster than it does on level ground. We therefore believe that it would be a wise precaution to plant several belts of birch or other hardwoods across the face of a hill, and to connect these cross-belts with other belts running up the face of the hill in any large plantation of fir or spruce. These belts need not necessarily be straight lines, and might be so laid off as to give a very good effect.

Some portions of the young plantations at Lintzel are damaged by the caterpillar of the pine-shoot *Tortrix* moth. One section in particular we noticed, where very many of the plants had lost their leading shoot by this pest boring into the pith.

The Scots firs grown upon the finer sandy land appeared to us to be of a very rough habit of growth, such as one sees upon land that is too rich for Scots fir at home; but upon the land composed of a grittier nature the firs assumed more of the habit one sees on the gravelly hill-sides in the north of Scotland. On the other hand, the young oaks had a very fine clean and healthy appearance upon the finer class of sandy land.

Taken as a whole, the State plantations at Lintzel are thriving very well, and give promise of producing good timber; and those in charge have no doubt about their being a success financially. But apart from any question of profit, the land, which before being planted supported but a scanty population, has now a colony of workers established upon it. The Government has also a small convict prison in the wood, and the prisoners are employed at whatever work is on hand, the institution receiving half the price paid to free labour. What a wide field is open to our Government for the use of convict labour and the unemployed, in clothing the hill-sides of Scotland and Ireland with timber! Will our nation's representatives make an honest trial with even 10,000 acres?

The State Forest of Lauenau.

A very large area of these woods is composed of beech, and are, as a rule, raised from natural seedlings, which readily spring up after the wood has been thinned so as to allow the sun's rays to get to the ground.

We do not think it is possible for us in this country to raise beech woods by natural seed in the same way as is done in Germany, because, in the first place, wood-pigeons and other birds would pick up all our seed as soon as it fell on the ground; and in the next place, we have as a rule so much herbage in our woods that it would cost less to plant with good sized plants than to prepare the surface for the seed. On the other hand, when the Germans begin thinning for the purpose of allowing seedlings to spring up, their woods are so thick that there is no herbage on the ground, and it is, therefore, a simple matter to scarify the surface, so as to give a good seed-bed; and there are very few wood-pigeons to eat the seeds.

On first seeing a section of young beech wood at Lauenau, the writer thought that the whole thing was ruined for want of thinning. The plants were about 20 feet high, and as thick upon

the ground as they could stand, the stems being so slender that they would not stand upright if grown singly. But on seeing the older sections where thinning operations had been carried out, one came to understand the utility of keeping the trees close; and on seeing the timber when ready for the final felling, it was a pleasure to look upon the fine, long, straight, clean stems, from which one could saw almost any class of scantling or boarding without being bothered with the dead knots, holes, and other blemishes so prevalent in our home-grown hardwoods. Under the German system of growing hardwood, there is very little chance of blemishes from decayed branches, as they all die off when quite small. The main idea is to get the trees up in height first, and then thin very gradually to allow them to increase in girth. This applies to all classes of timber, excepting that in pleasure-parks and places of public resort, where the trees are grown in open order, but such trees are not grown with a view to producing marketable timber. We have no doubt a German forester would regard many of our English woods to be very good specimens of public parks if intersected by walks and drives.

The spruce is grown upon the shallower soils, where it pays better than either beech or oak as a crop. The spruce woods are raised by planting, and the system adopted is, we consider, a very expensive one. The old roots are all dug out, and sold for firewood at a loss of something like seven shillings per cord. This rooting may be necessary to prevent the increase of insects and fungi, but this we are inclined to doubt, because they do not take all the roots up, and we should think that fungi at least would live upon the smaller roots left in the ground, although the stem and larger roots were removed. The planting is, we consider, very much more expensive than our Scotch mode of notch-planting. For three-year-old plants small pits are made, and into each pit they often insert five plants together. This they call bunch-planting, and they will require some 20,000 plants to plant an acre instead of 5000 required by the Scotch system, and even after planting so many per acre, they have to make up blanks.

Bunch-planting is useful where deer are numerous, as there is a chance of one or two trees in the bunch getting away, the damaged ones surrounding the good plants protecting them from the deer until they are strong enough to resist their attacks. We are surprised at the Germans allowing the deer to become so numerous as to cause the amount of damage we saw done in very many of their

woods, the more so when we saw no appearance of hares or rabbits, and were told that they would not tolerate them on any account. We presume the only reason is that the deer afford sport for the State foresters or private owners, as the case may be; and the trees must be to a certain extent sacrificed for this purpose. But after allowing for such damage, and considering the expensive mode of planting and the money paid to forest officers, the Germans make their woods pay a good yearly rent per acre; and what the Germans can do surely we can do. We have a better soil in our waste lands than the Germans have, and as good a climate for timber-growing.

The Upper Harz.

This district contains over 130,000 acres of timber, about 103,000 acres being spruce, the remainder, grown upon the better class of land near the base of the mountains, being beech and oak.

The matured spruce trees are as a rule very fine, long, straight, clean-grown trees, and when manufactured into battens and boards, produce superior-looking goods. In and near the Harz Forest many very elegant summer residences for visitors are built of spruce, and roofed with slate—that is to say, the framing and walls are wood—and they are in many cases artistically finished and painted outside.

Upon examining some of the battens and boards turned out from the saw-mills, we were struck with the very small appearance of warping shown in the sawn goods as compared with what would be the case in the same quantity of home-grown spruce or Scots fir if sawn in the same way. We have no doubt this is to be accounted for by the trees in Germany being grown so close that the sun's rays do not directly affect the stems, and in this way the trees are prevented from having what our saw-miller's term a hard side; and the layers of wood are more evenly put on than in our thin home-grown woods. We are of opinion that we over-thin our woods before the final clearing takes place, thereby exposing the stems of the trees to the sun's rays on the side, or half of the bole, facing the south, and causing a larger growth of timber upon that side, which is harder than that formed on the north side of the tree. When such trees are sawn up, the battens warp as they leave the saw, as if the hard side which faced the sun, expanded, or the

part which faced the north contracted. The writer has not enough scientific knowledge to explain this as he would like, but we know from practical experience that the trees cut from a thick wood where there is enough leaf canopy overhead to prevent the sun's rays striking the stems, will saw into anything required without warping; whereas trees that have had their stems exposed to the sun for any length of time are very difficult to saw straight, and very difficult to season without warping; this applies to conifers, and more especially to larch, Scots fir, and spruce.

A large quantity of small-sized spruce is used in the Harz district for making pulp for paper-making; one factory which we visited was said to have sent in one year over £30,000 worth of pulp to a single firm in England. We are convinced that the great bulk of our home-grown spruce would not be so suitable for pulping as the German spruce, on account of the large branch knots which it possesses, caused by the trees being too thinly grown. We understand that where the branch knots are large, they are cut out with a gouge before the wood is put into the pulping-machine; but the billets of spruce we saw ready to go into the machines in Germany had very small branch knots, and there was no appearance of any having been cut out, but otherwise the billets were very particularly cleared of bark.

The spruce is said to be by far the best paying crop in the Harz district. We were told that an acre of their best wood would produce at the final clean cut from 6000 to 7000 cubic feet of timber. This is a long way ahead of anything we have seen produced at home, from either spruce, Scots fir, or larch; in fact, it is considered a heavy crop if we get from 4000 to 6000 cubic feet per acre at the final clean cut; and the writer has oftener seen 2000 than 6000 cubic feet per acre from the last clear felling of fir woods in Scotland.

We were always under the impression that we over-thinned our woods, and since seeing the German method we are certain that this is the case. We cannot, however, always blame the foresters for over-thinning. In many cases a proprietor wants to have money out of a wood, and the thinning process goes on until there is only a skeleton wood left.

Something may also be said for the advocates of thinning, if it is only timber suited for the rougher and cheaper class of goods that is wanted, as for instance railway and other sleepers. By thinning early, Scots firs can be got up to a size suitable for cutting into sleepers much sooner than is the case under the German system,

but the wood so produced is only fit for rough work, and is not so durable as the close-grown timber. We therefore maintain that we should grow our trees, especially spruce and fir, though also certain hardwoods, closely when young, so as to produce clean stems having timber of good quality, and thus we could compete with all classes of foreign timber, instead of, as now, being able to compete only against the roughest and cheapest classes of imported timber.

The land throughout the Harz Forest is as a rule very steep and rocky; in many places the trees are growing on the bare rock, the roots finding nourishment in the clefts and fissures which abound. Comparing the land with our hill-sides at home, the writer thinks that, in Scotland at least, we have extensive areas of waste land much better adapted for timber-growing than the bulk of the forest lands of Germany.

The Academy of Forestry at Eberswalde and its surrounding Woods.

So far as the Academy is concerned, we had too little time to learn much; but from what we saw and heard there, we would be very pleased and greatly benefited if we could enter as students for two years to learn the science of Forestry.

The woods in the neighbourhood are utilised to give the students practical lessons in Forestry, and various methods of sowing, planting, and felling are adopted. But everything is done, so far as the planting and growing is concerned, with a view to produce clean marketable timber. We consider the system of planting practised here, as elsewhere in Germany, too expensive, and the labour employed in preparing the land unnecessary.

Regarding the system of trapping pine weevil which we were shown here, we do not think it could be applied in this country unless upon land of a pure sandy nature, such as obtained where the traps were in use near Eberswalde. The system referred to, is to dig a narrow trench around the patch planted, and to make holes about 12 inches deep every 15 yards. The weevils, in making their way to the young plantation, fall into this trench, and, from the sandy nature of the sides of the trench, they cannot climb out. They therefore find their way into the deeper pits, from which they are periodically gathered and destroyed. The piece of land, after being planted and surrounded by the trench,

is cleared of weevils by hand-picking. As already stated, this sort of trap is of service upon land of a sandy nature, but would be useless in the case of most of our woodlands at home, as the weevils would easily climb out of a trench made in our gravelly soils.

Generally, we are of opinion that Scottish foresters can very well hold their own with the Germans so far as planting is concerned, but we are a long way behind them in scientific knowledge. Nor do we produce the clean marketable timber which they do in Germany, and this simply because we over-thin our woods, and in some cases do not plant them thick enough to begin with. We did not learn that the German forest officers do anything in the way of manufacturing the timber. We think this is a question which our home foresters should study, because a man should know how to convert his crop to the best advantage after he has got it up; and unless a forester has a fair knowledge of what the crop he has for sale is best adapted for, and what it would cost to place it with the consumer, he cannot know whether he is receiving full value for his wood or not.

We have heard it remarked that we have not enough sunshine in this country to grow our trees so thickly as they do in Germany. The pieces of natural grown Scots fir woods which we have seen at home were never thinned, and, when fully matured, a horse could not pass between the stems, and when cut and sawn up produced boards the like of which we have never seen produced from thinned woods. We have also seen the same thing with planted beech woods. A piece which was in a remote situation, difficult of access, and was said to have been neglected, produced long clean stems of wood, the like of which could not be got in any of the woods which were supposed to be under good management. With the natural firs there had been sunshine enough to produce good timber, and if this was so in the past, why can it not be the same in the future? We are a long way from another Ice age, at least we hope we are.

We have further noticed that there is not the indiscriminate mixtures of different kinds of trees in Germany that we often find at home. The Germans appear to believe more in grouping or planting an entire wood of any one kind, if the soil appears to be best adapted for that kind.

NOTES AND QUERIES.

Insect Notes from Wiltshire.

As every locality has its own characteristic flora, so we also find the fauna differing in regard to species and their relative numbers in every county in the United Kingdom. The following notes, with regard to those insects which attack forest trees either annually or at irregular periods, may therefore be of interest for purposes of comparison with other districts.

Amongst moths, the most common is *Tortrix viridana* (Oak-leaf Roller Moth), which is a constant visitor in oak woods every summer. In 1894 the attack was particularly severe, but this year comparatively little damage was done. The heavy crop of beech seedlings this season was severely thinned by the caterpillar of a small moth, *Tinea parenthesella*, which eats the cotyledons, and in shady spots weakens the seedlings to a fatal extent. *Colcophora laricella* is also common on the larch, but with warm, genial springs does little damage. Two years ago considerable damage was done to the Scots pine in several young plantations by the larvæ of *Tortrix turionana* destroying the terminal buds of the leading shoots. During the present season I saw no traces of this moth or its work, so that the damage is gradually being obliterated. I have also noticed *T. comitana* on spruce needles, but not to any serious extent.

Coming to beetles, the most injurious here, as elsewhere, is the Pine Beetle (*Hylurgus piniperda*). In addition to the Scots pine, I have found it breeding in larch and Weymouth pine. It appears to have a double generation here, as is the case farther north. Amongst other *Bostrichidæ* may be mentioned *Hylesinus fraxini* and *crenatus*, *Hylastes palliatus* (on larch, spruce, and Scots pine), *Scolytus destructor* and *multistriatus* (on elm), *S. intricatus* (on oak), *S. carpini* (on beech), *Bostrichus bidens* (on Scots pine), *B. piceae* (on silver fir), *B. villosus* (on oak), *B. Lichtensteini* (on Austrian pine), *B. domesticus* (on felled elm, oak, etc.). Of these, *B. bidens*, *H. palliatus*, *S. destructor*, and

H. fraxini are by far the most common, but none of them are at all injurious to sound and fairly healthy trees.

Among the Weevils, we have no very formidable foe; the Pine Weevil, *Hylobius abietis*, which proves so troublesome in the north, being, so far as we know, a stranger in these parts. *Orchestes fagi*, the Beech Spring-Beetle, is present in greater or less numbers every season, but the damage it does is trifling. Another species of weevil on dry elm branches is also common, but I have been unable to identify the one or two mature insects which I have been able to secure. During our acorn season, *Balaninus turbatus* seems pretty common. The Pine Saw-Fly caterpillars appeared in rather large broods in 1893, and a few were noticed last year, but this season they have been extremely rare. We found crushing them to death between wisps of rough grass the easiest and most effectual means of extermination, the trees attacked being from 6 to 8 feet in height. Several species of *Cerambycidæ* are common here, the most common being *Callidium violaceum*, which often carves on the sap-wood of spruce slabs very interesting and artistic designs. I have also come across larch limbs with workings of what appeared to be *Lamia fasciculatis*, but could never find a mature specimen, and the larvæ of other species are frequently met with in dry and rotting oak. During the past summer, swarms of the small chafer *Phyllopertha horticola* abounded everywhere, but appeared to do little damage. During August the rooks have been busily engaged in rooting out their grubs on meadow-land. Ratzeburg states that it appears in exceptionally large numbers about every five years. The May Bug, *Melolantha vulgaris*, is not common here.

Amongst miscellaneous insects may be mentioned *Cynips corticalis*, *Kollari*, etc.; *Sirex gigas*; *Sesia apiformis*; *Chermes laricis*, *pini*, *abietis*, *piceae*, *fagi*, etc.; *Cossus ligniperda*, etc., etc., the damage done by these being usually insignificant, or confined to dying trees. With regard to measures of prevention, they may be said to still remain where they originated—in books. "*Insect extermination*" is not yet allowed for in estate labour bills or estimates, and so long as foresters and woodmen have their enthusiasm extinguished, or their lives shortened, by the depredations of rabbits, insects will probably regard civilised man as their best friend.

A. C. Forbes, Wood Manager, Bowood, Calne.

Driftwood and Insect Attacks.

As every "dweller by the sea" is aware, there is a large quantity of timber cast up on our shores every year. The most of it is either pine or fir, both sawn and round, and it is of all sizes. Most probably it has formed part of the deck cargo of vessels, and has been washed overboard in rough weather. A great deal of the round timber has the bark still upon it, and it is in this fact that a very serious danger lies to our plantations. As is well known, the inner bark of pine and fir trees is the breeding-place of many injurious forest insects, and under the bark of many of these stranded logs they are often to be found in hundreds. On a single piece of pitwood, 6 ft. long by 6 ins. diameter at the small end, I have counted, of larvæ and full-grown insects, no less than 321 specimens of *Hylurgus piniperda*, and 25 of *Pissodes notatus*, all alive and apparently in vigorous health. A few logs carrying similar colonies would soon work havoc among sickly or backward plantations near where they are stranded, and no doubt many attacks around our coasts have proceeded from this source. My experience with this insect-infested derelict timber has been confined to the coast districts; but woods in the inland mining districts are placed in the same danger where foreign pitwood is used, the insects hatching out while the timber is still on the surface of the ground.

It is very probable that the parent insects deposit their eggs in the bark late in the autumn or early in spring, after the logs have been felled, and are lying in the forest before being conveyed to the port for shipment. They have therefore ample time to hatch out and develop into full-grown insects by the time the logs are landed in this country, well on in the summer. The wonder is that the sea-water does not destroy them, but they do not seem to suffer in the least from the immersion they have been subjected to on the derelict logs.

The part of the country in which I am situated being on the Welsh side of the Bristol Channel, and quite close to the large coal-fields and coal-shipping ports of Glamorganshire, large numbers of these drifting logs are washed ashore in my neighbourhood. To judge from their bark and wood, the logs seem to belong to the maritime pine, *Pinus Pinaster*, and as extensive forests of that pine grow in the west of France, from whence

large supplies of pitwood are sent to this country, we may presume that we are indebted to our French neighbours for much of the trouble we have with insect pests in our young pine plantations.

For several years we have had a recurrence of severe attacks of the Branded Weevil, *Pissodes notatus*, notwithstanding our constant efforts to root it out. This year, however, I have discovered what appears to be the real source of the attack, those insect-infested derelict logs, and since then I have carefully stripped off and burned the bark of every log washed ashore. It is possible that similar attacks are occurring in other parts of the country, which, if inquired into, may perhaps be traced to the same source—imported timber, seriously infested with insect pests.

ARCHIBALD MITCHELL, Forester, Dunraven Castle.

THE DEPUTATION TO THE PRESIDENT OF THE BOARD OF AGRICULTURE.

At a meeting of the Council, held in the beginning of September last, Mr Munro Ferguson, the President of the Society, mentioned that the Right Honourable Walter H. Long, President of the Board of Agriculture, had agreed to visit Edinburgh for the purpose of conferring with the leading agriculturists of Scotland on agricultural matters, and suggested that advantage should be taken of this opportunity to ask Mr Long to receive a deputation, which should represent the views of the Society regarding matters affecting Forestry in Scotland. The suggestion was unanimously adopted, and on being appealed to, Mr Long very courteously agreed to receive the deputation in the office of the Secretary for Scotland, Parliament Square, on Wednesday, 23rd October, at 12 o'clock noon. A notice was inserted in the newspapers intimating the meeting, and inviting the members of the Society and others interested in Forestry to accompany the deputation. The result was a large attendance of members, and the Scottish office being too small for the meeting, the use of the New Court Room was obtained for the purpose.

Mr Long was accompanied by his private secretary, Mr Arthur W. Anstruther, and Sir Jacob Wilson, Director of the Land Division of the Board of Agriculture.

Mr Munro Ferguson, in introducing the deputation, stated generally the points to be raised, and referred especially to the advantage which would accrue to Forestry by the establishment of a separate office in Edinburgh, under the Agricultural Department, as proposed by the agriculturists of Scotland, provided an official having a particular knowledge of Forestry were attached to the office. The other points dealt with by the deputation were—the present condition of Forestry in Scotland, and the necessity for providing scientific training for young foresters, by Mr Andrew Slater, Haystoun, Peebles; the great and increasing importance of Forestry in Scotland, by Mr James Kay, Bute; the afforestation of waste lands in Scotland, by Mr D. F. Mackenzie, Factor, Mortonhall; the acquisition of forest areas for experimental and educational purposes, by Colonel Bailey, Lecturer on Forestry in the University of Edinburgh; and the limited facilities for obtaining Forestry education in Scotland as compared with Germany and other countries, by Dr Somerville, Professor of Forestry and Agriculture in the Durham College of Science, Newcastle-on-Tyne.

Professor Bayley Balfour afterwards spoke of the success which had attended the classes for instruction in Forestry at the Royal Botanic Garden, and urged the necessity for a further extension of the facilities for education on popular lines; and Sir Mark J. Stewart, M.P., referred to the afforestation of waste lands which had been carried out on the Continent, especially in Germany and France, and pointed out that Scotland afforded excellent opportunities for similar experiments.

Mr Long expressed his gratification at having had the opportunity of meeting the deputation, listening to the expression of their views, and learning the experience of those most qualified to speak on the questions relating to Forestry. He then proceeded to reply to the various speakers. He did not approve of the proposal to establish a sub-office in Edinburgh, but thought it would be possible for the Board of Agriculture to receive the assent of the Treasury to the appointment of a correspondent for Forestry, who might be able to collect information, and communicate to the Board at different times what was required by those who were engaged in Forestry in the country, and he hoped that he might himself be able to give effect to a proposal of that kind. While admitting what had been said regarding the great importance of covering our waste lands, he could not see his way

to advise their afforestation by the State, which would involve the risk of provoking competition between the State and private individuals, a result which, he thought, was undesirable. He would carefully consider the proposal for the acquisition of forest areas for experimental and educational purposes, but such a proposal would involve a new departure on the part of a State department, and also considerable outlay. Before, therefore, he could be in a position to make any suggestion of that character to his colleagues in the Cabinet, he must be absolutely satisfied in his own mind that such a departure would be justified by the present condition of things, and by the prospect of satisfactory results. In regard to the education of the subordinate ranks of those engaged in Forestry, he could not help thinking that something might be done through the medium of the County Councils, and he would keep that point in view and give the matter his careful consideration. He believed that they must bring the education to the people—they could not bring the people to the education.

In conclusion, Mr Long referred to the difficulty of doing anything of a practical character which would help people engaged in such pursuits as Forestry, and said that whether his power to help them was great or small, so long as he had the honour to fill his present position, it would be his duty, as it would be his pleasure, to do everything he legitimately could to help, not only the industry with which he was primarily connected, but any of those industries akin to agriculture, which, if they were successful, would cover the land with a fertile product, and would tend to help the producer and the labourer to make a fair living for themselves. He requested the members of the deputation more particularly interested in the matter to furnish him with an estimate of the cost of the proposed State Forests, and this has since been done by the President, Professor Balfour, Colonel Bailey, Mr Mackenzie, and Professor Somerville.

The President, in name of the Society, thanked Mr Long for granting the interview, and for his interesting and sympathetic reply. The Deputation then withdrew.

The Eighteenth Annual Excursion.

In a storm of wind and rain the ss. "Prague" (Captain Jeffrey) left the pier of Leith about 4.30 on the afternoon of Friday the 26th of July 1895, bound for Bremen, having on board thirty-three members of the Royal Scottish Arboricultural Society, being the majority of the members who had intimated their intention of taking part in the Excursion of the Society to the Forests of North Germany and the Forest Academy of Eberswalde. The remainder of the Excursionists travelled by different routes, and, with one exception, joined the main body at Bremen on the evening of the 28th.

The party consisted of the following members:—John Barron, Borrowash; W. B. Boord, Waterloo, Middleham; Charles Buchanan, Penicuik; Councillor Cameron, Edinburgh; R. W. Cowper, Sittingbourne, Kent; Robert Douglas, Edinburgh; Malcolm Dunn, Dalkeith; Wm. Erskine, Edinburgh; Malcolm Finlayson, Crieff; Robert Forbes, Clova, Lumsden; Wm. Forbes, Masham, Yorks; R. B. Fyffe, Lindertis, Kirriemuir; Robert Galloway, *Secretary;* James A. Gossip, Inverness; W. B. Havelock, Brocklesby, Lincolnshire; James Kay, Bute; Alex. M'Rae, Manchester; Samuel Margerison, Calverley, Leeds; R. V. Mather, Kelso; John Maughan, Jervaulx Abbey, Yorks; Alex. Milne, Edinburgh; William Milne, Foulden, Berwick-on-Tweed; Malcolm Morgan, Crieff; Wm. C. Orkney, Moncreiffe; Andrew D. Page, Culzean, Maybole; Walter Page, Myregornie, Kirkcaldy; A. D. Richardson, Royal Botanic Garden; Donald Robertson, Novar; James Simpson, Broughty Ferry; Andrew Slater, Haystoun, Peebles; Thomas Smith, Tring Park, Herts; Professor Somerville, Newcastle-on-Tyne; Wm. Tait, Edinburgh; David Thomson, Dunfermline; Wilson Tomlinson, Clumber Park, Notts; H. E. Underwood, Farnham Park, Bury St Edmunds; A. C. D. Vert, Edinburgh; Robert Wallace, Edinburgh; John Watson, Edinburgh; Jas. Wm. Watt, Carlisle; James Welsh, Edinburgh; William White, Edgefield, Loanhead.

The headquarters of the Excursionists at Bremen was the Hotel de l'Europe, where they were welcomed to Germany by Dr Adam Schwappach, Professor of Forestry, Eberswalde, who was specially commissioned by the Prussian Ministry of Agriculture and Forestry to act as the official guide of the party during the tour.

This gentleman made the whole of the arrangements in connection with the tour, and supplied the information for the time-table and guide which had been translated and put into the hands of the Excursionists before starting. The care which Professor Schwappach had bestowed upon every detail of the arrangements was evident at every step of the journey, and could only be fully appreciated by those present; whilst the great courtesy, patience, and kindness which he exhibited towards each member of the company could not be overestimated. Indeed, what has been said of Professor Schwappach might with equal truth be said of the whole of the German officers met with at the Forests and other places visited. The members of the Society owe a debt of gratitude to their German friends which it will be impossible to repay.

It is unnecessary to deal in this note with the Excursion from a Forestry point of view, as that part of the subject has been very fully treated in the "Short Account of Prussian Forests" by Dr Somerville, and the Essays by Messrs Slater and Robertson, all of which appear in the current number of the *Transactions*. All that is necessary here is to give a few details regarding the route and the social side of the Excursion.

In order to save the members as much trouble as possible with the financial arrangements, each member contributed a certain sum to a common fund, out of which all disbursements were made. The fund was converted into German money at Bremen, and the balance in hand at the end of the tour was re-exchanged at Hamburg. The arrangement worked very well, and appeared to give general satisfaction.

On Monday morning, 29th July, the Excursionists visited an agricultural experimental station in the neighbourhood of Bremen, and afterwards left by train at 11 A.M. for Brockhöfe. Here several hours were spent in driving through young plantations, and inspecting steam-ploughing operations, etc., at Lintzel. In the course of the afternoon the party was entertained to lunch in an improvised festive chamber, which had been very artistically decorated for the occasion with forestry tools and foliage. Over the entrance, in large letters composed of fir twigs, was the Forester's greeting, "Waidmann's Heil"; and on his plate each member found a beautiful bouquet of spruce and heather. Landesdirector Müller presided, and with him were Geheimrath Lauenstein and Landesforstrath Quaet-Faslem.

A number of toasts were proposed and replied to—Dr Somerville acting as interpreter. After being photographed, the party took train for Hanover, which was reached at 10.24 P.M., Hotel Kasten being the headquarters. Next morning, accompanied by Regierungs und Forstrath von Schlebrigge, Forstmeister Schultze, Forstmeister Hesse, and other officials, the party spent a very interesting day in the Forests of Lauenau and Springe. At dinner the same evening Dr Somerville intimated to Professor Schwappach that the Society had elected him an honorary foreign member, and the Professor gracefully acknowledged the honour conferred upon him.

Next morning, on the way to Goslar, the Excursionists were joined at Hildesheim by Reg. und Forstrath Betzhold, who accompanied the party during the whole of the Harz tour. At Goslar some time was spent in examining the quaint old buildings, and especially the Kaiserhaus, which, though closed against the public at the time because of restoration works being in progress, was specially opened for the benefit of the party. Much interest was manifested in the fine allegorical paintings on the walls of the old Parliament Hall, representing epochs of German history. The coronation chair and other relics were also objects of curiosity. Driving through the Okerthal, Altenau was reached, where the party lunched to the music of a band consisting of Forest workmen.

On resuming the journey, now on foot, the party was led a short part of the way by the Foresters' Band playing a lively march. The greater part of the journey from Altenau to the Brocken was performed under rather unfavourable circumstances, as the party encountered a severe thunderstorm, which was accompanied and followed by torrents of rain. In spite of the weather, however, the journey was a very creditable performance. The hotel was reached about 8 P.M., and after some time had been spent by the members in various ways until their clothes were dried, they dined in the large hall in company with their German friends. At dinner that evening the table was honoured by the presence of Oberforstmeisters Müller and Ohnesorg, the heads of the Forest Department of Prince Stolberg, with their wives, and by Dr Grundner, Brunswick Forest Officer of the District. Healths were drunk, speeches made, songs—German, Scottish, and English—were sung, and altogether a delightful evening was spent.

Next day the party walked through the Forests of Prince

Stolberg, and afterwards drove to Harzburg, where the members bade an affectionate farewell to their kind friends of the Harz, and took train for Berlin, which was reached at 9.23 P.M. The Savoy Hotel, in Frederich Strasse, an excellently equipped and very comfortable house, was the headquarters for the next four nights.

At Eberswalde, which was visited on the following day, the Excursionists were met by Principal Dankelmann and by Professors Runnebaum, Altum, Remelé, etc., as also by Herr Booth and Dr Bolle, and were shown over the Forest Academy, Nurseries, and Forests in the neighbourhood. In the course of the afternoon Professor Remelé, who is an enthusiastic amateur photographer, took a photograph of the party, which has been reproduced in large size suitable for framing, and is for sale by the Secretary. The following is a copy of the inscription proposed to be engraved on a stone which is to be erected in the Forest:—

"To commemorate the visit of the Royal Scottish Arboricultural Society to the Academy and Forests of Eberswalde on 2nd August 1895."

On Saturday the 3rd of August the party visited Freinwalde. At dinner, which was served in the Curhaus, formal good-bye was said to Professor Dankelmann and his colleagues, including Professor Schwappach, who had been summoned to rejoin his regiment, and had to set out that evening. In thanking Professor Schwappach, in name of the Society, for his services, Professor Somerville said that no words could express the debt of gratitude which the Excursionists owed to Professor Schwappach, who had marched at their head during the past week, and had indeed been their guide, philosopher, and friend. In a few words Professor Schwappach expressed the great pleasure it had afforded him to guide such an intelligent party, and hoped that the connection which had now been made would last for ever. He expected to visit Scotland soon (probably next year), where he hoped to renew the friendships which had been begun in Germany. Meantime he hoped that the Excursionists would carry away pleasant recollections of their trip to Prussian forests and the Forest School of Eberswalde. Professor Schwappach returned to Berlin along with the party, and in the course of the evening the Excursionists presented him with a field-glass, by Zeiss of Jena, on which the following inscription was engraved:—"In remembrance of the Excursion of the R.S.A.S. to Germany, July-August 1895."

The following day the Excursionists visited, by special permission, the famous Agricultural Museum in the Invaliden Strasse, where several of the Professors of the Agricultural College were in attendance to conduct the visitors over their several departments; and, on the same day, through the kindness of Herr Booth, they were enabled to see the Royal Palaces and Parks at Potsdam. In the evening they dined together at the hotel, when good-bye was said to several members who intended to leave for home early next morning. Mr Barron, Borrowash, in a humorous speech, proposed the health of Professor Somerville, who had vied with Professor Schwappach in his efforts to make the Excursion the great success which it was. The toast was enthusiastically drunk.

The homeward journey was begun on August 5th. Berlin was left at 9 A.M., and Hamburg reached at 1.4 P.M. After lunch, a short visit was made to the nurseries of Messrs Heins at Halstenbeck, where the party was very hospitably entertained. Here a photograph was taken, of which a large copy has since been presented by Messrs Heins to each of the members included in it.

The party left Hamburg on board the ss. "Breslau" about midnight on Monday, and after a pleasant voyage reached Leith all well about 4 o'clock on the afternoon of Wednesday, 7th August.

On the homeward voyage the Excursionists took an opportunity to thank Professor Somerville for his services as interpreter to the party during the tour, and for the great trouble he had taken in connection with the preliminary arrangements. They also presented him with a field-glass by Zeiss as a memento of the Excursion.

At the same meeting Messrs Richardson and Margerison, who had taken numerous photographs during the Excursion, very kindly expressed their willingness to give the committee the use of such of their negatives as might be desired, and it was accordingly resolved to expend the balance of the common fund in preparing an Album for each of the party, which should contain portraits of Professors Dankelmann, Schwappach, and Somerville, a view of the Forest Academy at Eberswalde, a selection of the views taken *en route*, and a descriptive index. The Album, which is a very handsome one, will be a very appropriate souvenir of a most delightful and instructive Excursion.

After the return of the party, the president, Mr Munro Ferguson of Raith and Novar, offered a prize of £10 for the best

Essay on the Excursion, and Mr Barron, Borrowash, and Professor Somerville each offered £1, 1s. towards a second prize. Seven very interesting Essays were received and submitted to the judges, who awarded the first prize to Mr Andrew Slater, Haystoun, Peebles, and the second prize to Mr Donald Robertson, Novar. These two Essays appear in the *Transactions*.

[As the Secretary is responsible for the above descriptive note, it was not to be expected that anything regarding the part which he himself took in arranging the Excursion would be found in it. It is but right, however, that acknowledgment should be made of the efficient manner in which he discharged his arduous duties, and earned the grateful thanks of every member of the party.]

Royal Scottish Arboricultural Society.

EXCURSION

TO

STRATHSPEY, MORAY, AND BANFFSHIRE.

1894.

ROYAL
SCOTTISH ARBORICULTURAL SOCIETY.

EXCURSION TO STRATHSPEY, MORAY, AND BANFFSHIRE.

The Seventeenth Annual Excursion of the Society was held on the 7th August and the three following days. Its locus lay in those thickly-wooded districts in Strathspey, Moray, and Banffshire, the fame of which, for the growth of natural forests of our indigenous Pine (*Pinus sylvestris*), the Scots pine, or "Scots fir," as it is more commonly called, is justly merited, and satisfied in the amplest degree all the anticipations which may have been aroused previous to visiting the forests. The time allotted for the Excursion was comparatively short, when we consider the boundless wealth of arboreal interest contained in these forests, and the mass of arboricultural knowledge to be gleaned by the diligent and painstaking practical forester. But fortunately, assistance of the most valuable character was extended to the Society by the various officials on the different estates, not only prior to the Excursion in the way of preparing plans of the routes to be taken and lists of the objects to be seen, but also by accompanying the Excursionists during their sojourn in the north, in order to act as guides and ensure the proper carrying out of the arrangements. With what success these efforts were crowned it is quite unnecessary to mention here. They were fully appreciated by every member, and the knowledge of this fact is in itself the greatest thanks that could be rendered to their authors, who must necessarily have been as delighted with the result of their labours as those on whose behalf they were expended.

The number of those who took part in the Excursion was well up to the usual standard, and among others included the following gentlemen:—C. Adamson, Leven, Fife; Lewis Bayne, Scone, Perth; A. Boa, Dalton, Newcastle; A. Brownlie, Earlston;

John Brydon, Rothes; Charles Buchanan, Penicuik Estate; T. Cabry, Nisbet Hill, Duns; James Campbell, Old Cullen House, Cullen; Jas. Carr, Glenmore, Strathspey; William Christie, Fochabers; Wm. Clark, Edinburgh; Ernest Collins, Lillieshall, Newport, Salop; R. T. Collins, Trentham, Stoke-on-Trent; R. W. Cowper, Sittingbourne, Kent; David C. Darling, Aberdeen; Wm. Dawson, Gordon Castle; Alex. Dingwall, Perth; Malcolm Dunn, Dalkeith; A. J. Farquharson, Newtyle, Forfarshire; William Gemmell, Macmerry, East Lothian; William Gilchrist, Leuchars, Elgin; John G. Gordon, Edinburgh; James A. Gossip, Inverness; Alex. Grant, Rothiemurchus, Strathspey; D. Grant, Glenmore, Strathspey; J. Grant, Grantown, Strathspey; George Hannah, The Glen, Innerleithen; Robert Henderson, Penicuik; Robert Innes, Fochabers; John S. Ireland, Edinburgh; George Jack, Dalkeith; James Kay, Rothesay; William G. King, Kingsmills, Elgin; David P. Laird, Edinburgh; James Lees, Glen Grant, Rothes; George Macdonald, Innes House, Elgin; Major M'Gregor, Penicuik; Hector Mackenzie, Glenmore, Strathspey; William M'Laren, Altyre, Forres; William Malloch, Perth; W. H. Massie, Edinburgh; R. V. Mather, Kelso; John Methven, Edinburgh; John Methven, Blythswood, Renfrew; C. Y. Michie, Cullen House; Alex. Milne, Edinburgh; J. K. Milne, Kevock Tower, Lasswade; William J. Moffat, Edinburgh, *Secretary;* Alex. Morgan, Crieff; Malcolm Morgan, Crieff; John Murdoch, Dalkeith; John Riach, Rothes; Daniel Scott, Darnaway, Forres; David P. Scott, Dundee; John Scott, Gordon Castle; John Scrymgeour, St Martins, Perth; William Shaw, Ballingry, Lochgelly, Fife; Andrew Slater, Haystoun, Peebles; J. Smith, Inverallan House, Grantown, Strathspey; J. F. Smith, Cullen House; John Stephen, Abernethy, Strathspey; Robert Storie, Dalkeith; C. Stuart, Grantown, Strathspey; D. Thomson, Dunfermline; J. Grant Thomson, Grantown, Strathspey; J. Waddell, Leven, Fife; Robert Wallace, Leith; James Ward, Keith; John Watson, Edinburgh; Charles Webster, Gordon Castle; James Welsh, Edinburgh; Alex. Williamson, Edinburgh; George Williamson, Leven, Fife; and William Wood, Newton Don, Berwickshire.

The North British Railway Company supplied special saloon carriages for the Excursionists, which conveyed them over the whole railway journeys, and added much to the comfort and convenience of the Members.

FIRST DAY.

Tuesday, 7th August.

ROTHIEMURCHUS, GLENMORE, AND ABERNETHY.

The company assembled soon after 4 o'clock on Tuesday morning on the platform of the Waverley Station, Edinburgh, in order to proceed by the North British train at 4.28 A.M. for Perth. The route was *viâ* the Forth Bridge and Glenfarg. Both formed objects of much interest, the former as being one of the greatest monuments of engineering skill and national resource; the latter as being one of the items in the programme of the Excursion held in 1892. Numerous other bits of typical Scottish scenery were passed on the way, and contributed in a pleasing manner to relieve the otherwise tedious character of a railway journey at so early an hour.

Perth was reached at 5.33 A.M., and here a short interval of half-an-hour was allowed to enable the party to breakfast in the Station Hotel, prior to resuming the journey to Aviemore *viâ* the Highland Railway. After breakfast, a start was made at 6.10 A.M., and soon a foretaste was had of the rich store of arboreal interest held in reserve for the day's examination. Each moment revealed new attractions characterised by features peculiar to themselves, and calculated in the highest degree to satisfy the appetites of the visitors, whetted by the none too extravagant accounts of the varied and superb picturesqueness of the country through which the route lay.

About two miles after leaving Perth, Scone Palace was seen on the right, beautifully embosomed in a richly wooded landscape on the north bank of the river Tay. For some miles the railway ran through portions of the Earl of Mansfield's Scone estates, so well known among foresters for their extensive woodlands, and the celebrity they have attained as examples of good forestry. A notable object seen on the left, soon after Stanley Station was passed, was the Taymount plantation of Douglas Fir formed by the late Mr M'Corquodale, forester on the Scone estates; and recently added to by his successor Mr Lewis Bayne; both old and young trees looking the picture of good health. A little farther on, the route ran for several miles through the richly wooded Murthly estates of W. S. Fotheringham, Esq., which were visited by the Society in 1892, and are famed for their wealth in

Exotic Conifers, glimpses of which were caught, chiefly on the right, all the way to Birnam.

At the Pass of Birnam the route entered the defiles of the Grampians, through which it threads its way for many miles amid scenery of great splendour. Passing Birnam, the landscape is perhaps unrivalled in the whole range of the Grampian mountains—trees, meadows, hedges, waters, woods, steep crags, and towering mountains — all mingling together in perfect harmony and picturesque grandeur. On the right, across the Tay, was seen Dunkeld, with the towers of its ancient Cathedral standing amidst the trees close to the town, and marking the site of the famous "Mother Larches," the first planted in Scotland, in 1738, by the Duke of Athole, two of which still remain within a few yards of the west tower of the Cathedral. The route now lay up Strathtay, with the steep hills on both sides thickly wooded to their summits.

We were now in the country of the Larch, and immense plantations rear their head on every side. The famed larch plantations of Loch Ordie, on the Dunkeld estate of the Duke of Athole, lie high on the hills to the right, and mostly out of view; but their produce was in evidence at every railway station we passed, where immense piles of larch and other timber indicated the importance of the Forest industry in the district. At Ballinluig, Strathtay was left, and the route lay along Strath Tummel. On the left, in passing Ballinluig, a handsome Celtic cross, erected in 1866 to the memory of the sixth Duke of Athole, was seen standing conspicuously on the "Castle-hill," behind Logierait, — a village famed for its "Dool Tree," on which caitiffs were formerly hung, and long known as the "Muckle Ash Tree o' th' Boat o' Logierait." It is said to have measured 60 feet in height and 40 feet in girth at 3 feet up, but only the hollow trunk now remains, and is used as a summer-house in connection with the hotel. Soon Pitlochry, with its numerous villas and splendid Athole Hydropathic, was passed, and the line entered the far-famed Pass of Killiecrankie,—the precipitous slopes of the narrow gorge through which the Garry flows being richly clothed with natural oak and birch, and presenting a scene of remarkable beauty and grandeur. At the top of the Pass, in a flat haugh on the right just before Killiecrankie Station was reached, the field was seen where the battle of Killiecrankie was fought on the 27th July 1689, between the royal troops under General Mackay, and Viscount Dundee.

It proved disastrous to Mackay and fatal to "Bonnie Dundee," whose body was carried to Blair Castle and buried in "the old Church of Blair, o'ershadowed with trees." Aytoun's stirring lines aptly described the famous battle :—

"Like a tempest down the ridges
Swept the hurricane of steel,
Rose the slogan of Macdonald,
Flash'd the broadsword of Lochiel!
Vainly sped the withering volley
'Mongst the foremost of our band;
On we poured until we met them
Foot to foot and hand to hand.

"Horse and men went down like driftwood,
When the floods are black at Yule;
And their carcases are whirling
In the Garry's deepest pool.
Horse and man went down before us,
Living foe there tarried none,
On the field of Killiecrankie
When that stubborn fight was done."

The capital of the district, Blair-Athole, was soon reached, and Blair Castle was seen on the right, standing on a fine site in the midst of an extensive and richly-wooded domain. The disastrous gale of the 17th November 1893 committed sad havoc among the grand old trees and well-grown plantations around Blair Castle, and the effects of it will be seen in the district for a generation to come. The older plantations and the ornamental woods in the policies suffered worst, and the loss in consequence was the more heavy, and much to be deplored. About two miles beyond Blair, the extensive young plantations in the Bruar district began to appear, and extended for a considerable distance along the route. They were all formed within the past quarter of a century by the Duke of Athole, and present a thriving and promising appearance at this high altitude in the heart of the Grampians.

As we cross Bruar Water, the romantic Falls of Bruar lie close at hand on the right, in a rugged but beautifully wooded gorge, or "Pass," and bring to mind the sweetly poetic and successful appeal of our national bard, Burns, after he had visited the then bare rocky spot, when staying for a few days at Blair Castle with the Duke of Athole, in the autumn of 1787. Addressing his noble host in "The Humble Petition of Bruar Water," which should be popular with every arborist, he says:

"My lord, I know your noble ear
Woe ne'er assails in vain;
Embolden'd thus, I beg you'll hear
Your humble slave complain.

"Here, foaming down the shelvy rocks,
In twisting strength I rin;
There, high my boiling torrent smokes,
Wide-roaring o'er a lin:

"Enjoying large each spring and well,
As nature gave them me,
I am, altho' I say't mysel,
Worth gaun a mile to see.

"Would, then, my noblest master please
To grant my highest wishes,
He'll shade my banks wi' towering trees,
And bonny spreading bushes.

"Let lofty firs, and ashes cool,
My lowly banks o'erspread,
And view, deep-blending in the pool,
Their shadows' wat'ry bed!

"Let fragrant birks in woodbines drest
My craggy cliffs adorn;
And, for the little songster's nest,
The close-embow'ring thorn.

"Delighted doubly, then, my lord,
You'll wander on my banks,
And listen mony a grateful bird
Return you tuneful thanks."

Onwards through Glen Garry the scenery bears a truly alpine aspect, and presents the same grandly rugged mountainous character through the Pass of Drumochter, at the head of which, on the boundary between Perth and Inverness, the railway reaches its summit-level, at an altitude of 1484 feet. The run through the deer forest of Drumochter,—"the cold ridge"—down Glentruim, was wild and desolate, broken only by a glimpse of civilisation at Dalwhinnie, until the upper valley of the Spey was reached near Newtonmore. The route now lay down Strathspey, and every mile of it became more beautiful and richly clad with woodlands, chiefly natural forests of the Scots fir. The capital of Badenoch, Kingussie,—"the head of the fir wood,"—a small but thriving and busy place in summer, was seen on the left as we stopped at the station, and on the right, at a short distance away, the picturesque ruins of Ruthven Barracks stood out prominently on

a small knoll on the site of the ancient Castle of Ruthven, the stronghold of the "Wolf of Badenoch" in the latter half of the 14th century.

Macpherson, the "translator" of Ossian's poems, was a native of Ruthven, and was teacher for some time in the parish school. A little beyond Kingussie, his monument was seen on the left, near Belville House, where he resided in his latter years. Further on, the Spey flows through Loch Inch, a beautiful expanse of water on the right. After passing Kincraig Station, the romantically-wooded heights of Kinrara appeared on the right, crowned by a tall granite monument to the fifth Duke of Gordon; and near by was seen on Tor Alvie a huge cairn erected to the memory of the Highlanders who fell at Waterloo. The old 92nd regiment, "The Gordon Highlanders," raised in Strathspey in 1794 by the beautiful Jean fourth Duchess of Gordon, fought through the Peninsular War and at Waterloo, and in many a gallant fight since then, and were that week celebrating their centenary at the headquarters of the regiment, lying at Glasgow. The famous Duchess lies buried in a lovely secluded spot, chosen by herself, at Kinrara, where a beautiful monument is erected to her memory. A mile or two below Kinrara, rises, on the left, the bold rocky front of Craigellachie, or the "Rock of Alarum," wooded to the summit. This district is the country of the Clan Grant, whose war-cry or slogan is, "Stand fast, Craigellachie!" The seat of the Chief of the Clan is Castle Grant, about 15 miles lower down the Strath.

Aviemore was reached at 8.50 A.M., and there a number of well-horsed carriages were in waiting to convey the Excursionists through the extensive forests of natural Scots Pine in Strathspey. Here a number of members from the north joined the Excursion, and the following gentlemen acted as guides to the party for the day—Mr Grant, factor to J. P. Grant, Esq. of Rothiemurchus, Sheriff-Substitute for Banffshire; Mr Smith, factor, and Mr Grant Thomson, wood-manager to the Countess Dowager of Seafield, at Grantown; Mr Grant, forester to His Grace the Duke of Richmond and Gordon at Glenmore; and Mr Stuart, forester, Grantown. Their intimate knowledge of the estates to be visited, and their practical acquaintance with all that concerns the growth of woodlands, proved of the highest value, and made the day's outing one of the most interesting and instructive the Members ever enjoyed.

To Mr J. Grant Thomson the Excursionists were specially indebted for the great trouble he had taken in carefully arranging every detail of the two days' programme in the Forests of Strathspey. By his skilful arrangements and directions each day, the party reached the halting-places at the appointed minute, and the day's work was accomplished with an ease and exactitude never before equalled. The programme for this day, as drawn up by Mr Thomson, and carried out to the letter, was as follows:—

First Day in Strathspey Forests.

Miles from Aviemore Station.	Names of Places.	Time of Arrival.	Remarks.
	Aviemore, . .	8.40 A.M.	Arrive at Aviemore. Refreshments. Start in carriages for the Forests.
2½	Loch-an-Eilein,	10 ,,	Island. Ruined Castle. Osprey's nest. Echo. Fine scenery. Old Scots Firs.
9½	Loch Moirlich,	12.30 ,,	Entrance to Glenmore Forest. Glenmore Lodge. Picturesque Loch in midst of Forest.
12½	Cobbler's Rock,	1.30 P.M.	View of Aviemore and Strathspey Woods.
17	Loch Garten, . .	2.30 ,,	Highland Luncheon in the Forest, on the shore of Loch Garten.
20	Torehill, . . .	4.30 ,,	Fine view of Strathspey Woodlands.
27	Nursery, . . .	6.30 ,,	Drive through the old Natural Forest of Abernethy. Grand Scots Firs. Estate Nurseries.
30	Broomhill, . .	8 ,,	Train, *viâ* Forres, for Elgin.

Soon after leaving Aviemore, the carriages halted at the schoolhouse at Inverdruie, where, by prior arrangement, light refreshments were served to the company. Starting again on their drive to Loch-an-Eilein, the road lay through a district of most enchanting scenery. Stretching for miles in every direction, the eye wandered over vast breadths of Scots pine forests, diversified here and there by glades of enticing beauty or tracts of arable land, while fringing the horizon by the outlines of their massive ridges stood in solemn grandeur the higher peaks of the Cairngorm range and other groups of the Grampian mountains. On the right was passed "The Doune," the home of the Grants of Rothiemurchus, the castellated towers of which were seen above the tops of the embosoming trees amid rich woodlands. The policies are widely famed for their beauty and the luxuriance of tree-growth, especially of the coniferous family,

with which they are adorned. A little farther on, the road skirts the base of Ord Bain, where the limestone formation probably accounts for the extreme vitality of the larch in this neighbourhood. Its slopes are clothed with the common silvery-barked birch, whose gracefully drooping branches, and conical, shapely habit, together produce an exceedingly beautiful aspect.

On reaching the foot of Loch-an-Eilein, a beautiful sheet of water, fringed with dark, sombre pines and graceful birches, the Members alighted and walked along the forest road, bordered by stately Scots pine, larch, and spruce, with an undergrowth of junipers and tall ferns that seemed to find here unusually suitable conditions for their growth. On the opposite side of the loch the mountain sides were seen to be thickly studded with fine holly trees of great age and size, which were growing well, up to an altitude of fully 1600 feet above the level of the sea, or about 800 feet above the surface of the loch. It was computed that many of the Scots pines on this portion of the estate of Rothiemurchus are at least 250 to 300 years old. The largest seen, a sturdy, massive-headed tree, standing between the road and the loch, girthed 12 feet 3 inches at 5 feet up, and another, barely equal in size but of better quality, measured 10 feet 7 inches in circumference at 4 feet up. A small islet in the loch, about 60 yards from the shore, was an object of much attraction. On it stands the ruins of one of the ancient strongholds of the "Wolf of Badenoch," on the top of which the osprey, or sea eagle, has built its nest for centuries, and it is said to be the only spot in the country where the osprey now builds. The hen-bird was clearly observed from the shore, sitting in perfect security in her rudely constructed nest, beyond the reach of all prowling enemies; and Mr Grant said that every precaution was being taken to insure the safety of the birds.

Parting with Mr Grant, factor for Rothiemurchus, on the confines of the estate, the drive was continued in the direction of Loch Moirlich, situated on the Duke of Richmond and Gordon's estate of Glenmore, Mr Grant, wood-manager on that estate, now leading the party. After crossing Coilan Bridge, the road entered a long stretch of Scots pine of the second crop, giving every indication of a healthy nature, and promising to become in the near future a wood of the greatest commercial value. Here, as we passed along, there was seen, in a noticeable manner, a most instructive feature in connection with the natural repro-

duction of Scots pine forests; that it is only when the heather has superseded the original covering of grass will the process of germination take place and the trees grow. In the more open parts especially was this forced upon our attention, for both conditions were present, and clumps of young wood were seen growing thickly and freely among the patches of heather in close proximity to grassy spaces where none had yet made their appearance.

Loch Moirlich, a fine expanse of water, about one and a half mile long and a mile wide, is situated at an altitude of 1046 feet above sea-level, under the shadow of Cairngorm, whose huge shoulders, fringed with a narrow strip of woodland, slope steeply down to the water. The scenery here is of a truly Highland character, and produces an awe-inspiring and elevating influence on the mind, as well as a just pride in the grand natural beauties of our native country. Beside Cairngorm, which is 4084 feet high, several of the highest peaks of the Grampians were within view. A few miles off Braeriach, 4248 feet, was seen, with the snow still lying in its deep rocky corries; and Ben Macdhui, 4296 feet, with its huge massive crest, one of the highest, if not the highest mountain in Britain, being the more noticeable of the group. The handsome castellated shooting-lodge of Glenmore stands on a fine site in the forest on the north shore of the loch, and commands a splendid view of the magnificent landscape.

After surveying the grandeur of the scenery for a short time, the party moved off again in the carriages in the direction of the Cobbler's Rock, under the guidance of Messrs H. Mackenzie and J. Carr, foresters on the estate. The Scots pine continued to be of the same excellent growth, and possessed qualities eminently suited for commercial purposes. A feature of interest was the increasing number of ant-hills encountered, which seemed to abound here, and which in many cases measured from 5 or 6 feet in height. On reaching the Cobbler's Rock, the party alighted with the intention of ascending, but owing to the recent heavy rains, and the wet state of the tangled undergrowth, it was deemed advisable to forego this part of the programme. The journey was thereupon continued through the Cobbler's Rock Glen, the road lying high along the precipitous face of the hill, which descends almost perpendicularly to a great depth, producing misgivings in the minds of some of the Excursionists for their ultimate safety, as the carriages swayed to and fro in a

rather alarming fashion, threatening each moment to precipitate their occupants to the bottom, as they sped on their way to the foot of the glen. The Millton burn, which flows through the Glen, is made use of by dams and sluices for the purpose of floating the trees from the forest to the estate saw-mills at Kincardine, which were seen in full operation near the mouth of the burn before it entered the Spey. On approaching the mouth of the glen, a magnificent panorama of the Strath lay spread out before the company. On the left, the vast plantation of Aviemore Hill came into sight, and its great extent was fully recognised from the elevated position of the road. It covers an area of 11,000 acres. About twenty-five years ago, nine million trees were planted here by the Earl of Seafield, in addition to the natural growth of pines on the ground prior to these extensive planting operations. Duthil district was also pointed out in the distance. There the forests are of natural growth, and contain large numbers of trees whose sizes are in no way inferior to those embraced within the area of the Excursion. Straight in front lay the fine Scots pine plantation of Desher, covering over 1000 acres, and on the extreme right a glimpse was caught of Loch Garten, for which we were bound, snugly ensconced among the woods of Abernethy. Bounding the whole scene to the left, the high ridges of the Monadhliadh ("Grey Hills") range were dimly visible far away on the horizon.

On emerging from the Glen, and passing the saw-mills, the Seafield property was soon entered, and the drive for the next three miles was through a fine open country towards Abernethy. On the right was passed the old parish church of Kincardine, which was pointed out as possessing a small window where at one time persons afflicted with leprosy used to congregate in order to listen to the service going on within the sacred edifice—a precautionary measure to prevent the spread of this loathsome disease by contagion. On the opposite side, a short distance off, attention was drawn to Tullochgorum Farm, where the sprightly reel music of Skinner's famous song is said to have had its origin. The circumstances of the composition of the song of "Tullochgorum" are well known, but may be here recounted. On one occasion the Rev. John Skinner was visiting a friend, and in company with a few others was discussing some of the burning political questions of the day. The conversation gradually became heated, and the antagonists were growing wrathful, when

the hostess, noticing this, intervened, and, exercising all the tact at her command, succeeded in getting her reverend guest to indite words to the tune of Tullochgorum, in order to divert attention from the dispute and soothe their ruffled minds; the result being the inimitable song.

At the entrance gate to Abernethy Forest, the Excursionists received a right good Highland welcome from Mr Stephen, forester, who, accompanied by a piper in full Highland costume, playing well-known popular airs, led the way to a triumphal arch of native evergreens and flags erected over the avenue near Loch Garten. Here, in the heart of the Scots pine forest, by the side of the loch, under the shade of the ancient trees, the company were hospitably entertained to luncheon by the Countess Dowager of Seafield. A scene more appropriate and picturesque could not well be imagined, and after their long drive in the bracing air of the forest, the guests did every justice to the ample repast put before them. Mr Smith, factor on the Seafield estates, occupied the chair, and was supported by Messrs J. Grant Thomson, Malcolm Dunn, John Methven, Alexander Milne, and Andrew Slater.

The Chairman proposed the toasts of the Queen—patroness of the Society—and of the Prince and Princess of Wales and the other members of the Royal Family, which were heartily responded to.

Mr John Methven, Vice-President, proposed the health of the Countess Dowager of Seafield. He said that they all thoroughly appreciated the generous hospitality of her ladyship, and the genuine liberality displayed in throwing open to the Society's inspection the grand forests and woodlands through which they had passed that day, and through which they were to travel for three days to come. They had all heard of the good work her ladyship had done in the past and was doing at the present moment. She was known over the north of Scotland as a lady who was always anxious to render aid to those in need of it, and never failing in her efforts to do good to those among whom she lived.

The Chairman then gave the toast of the day—Success to the Royal Scottish Arboricultural Society. In doing so, he gave the members a hearty Highland welcome to Strathspey. They were now sitting at lunch in the shade of one of the oldest woods on the estate, and in the midst of the largest Scots fir forests in Britain. They had seen much that was of interest since they entered it, but they had only as yet touched the fringe. By the

time they departed they would have seen much natural pine forest that could not easily be equalled.

Mr Methven, in responding for the Society, said they had spent a very pleasant and instructive forenoon, and would long remember the kindness of the proprietors in allowing them to inspect these extensive forests. Many of them would remember that last year they visited Her Majesty's forests at Windsor and others in the south of England, but he did not think they had seen anything in the way of natural forests that could be compared with what they had seen that day. He was sorry that, on account of a slight indisposition, they had not the pleasure of having her ladyship's commissioner, Mr Logan, with them; but they were fortunate, however, in having her factor, Mr Smith, who had done so much for the success of the day's excursion. He had brought to his mind that they had several vacancies in the ranks of their honorary members, and if it was agreeable to the wish of the company, he proposed that Mr Logan be elected an honorary member of the Society.

This proposal was received with acclamation by the whole company.

Mr Methven then proposed the health of the Chairman; and Mr Smith tendered his most cordial thanks to the Members for the hearty way in which they had responded.

Mr Dunn proposed the toast of Mr Grant Thomson, whose services as leader of the party during the day had been invaluable.

Mr Thomson replied in a few appropriate words, and took advantage of the opportunity to inform the party that on reaching the home nursery, Lady Seafield had given orders that they were all to be presented with a young Scots fir raised from seed ripened in the natural forest, to be taken home with them as a memento of their visit.

Shortly after the Members bade farewell to the romantic spot by Loch Garten, and took their seats in the carriages to complete the day's programme.

A short drive was enjoyed through a fine healthy pine wood of about two hundred years' growth, showing all the features of unhindered natural production. This part of Abernethy Forest contains, in all probability, its finest specimens of the Scots pine, and as the party proceeded, the trees became larger and more interesting to the arborist, until upon Torehill being reached

Nature seemed to have "outlavished" herself in the profuseness of tree-growth, from the seedlings of the year to the giant veterans of centuries. The company, on reaching the base of the hill, proceeded to ascend to its summit. A great storm about twenty years ago played serious havoc in this part of the forest, and it was indeed a piteous sight to behold the giants of the wood laid prone in the dust in the full vigour of their maturity. Nevertheless, a regular crop of splendid trees are still covering the hill. Towards the end of the last century this hill was the scene of a great forest-fire, which consumed the larger part of the vegetation, and even after so great a lapse of time evidences of it still exists, the ground being covered with a thin layer of burnt earth and charcoal. One striking feature here, in connection with the undergrowth of juniper, was its great height, and generally bearing a heavy crop of berries. Although all over the district this is the prevailing undergrowth, it attains its greatest stature on Torehill, and some of the tree-like bushes were found to measure fully 20 feet in height. From the summit a wide and beautiful prospect of the strath lying towards the north was obtained. Castle Grant, the chief seat of the Countess Dowager of Seafield in Strathspey, was seen rising above the woodlands away in the far distance; while nearer at hand, a bird's-eye view was had of the extensive plantations of Abernethy, Duthil, and Cromdale. Owing to the commanding position of this point, it was selected in 1858 as the site for a huge bonfire in honour of the seventh Earl of Seafield when the title of Baron Strathspey was conferred upon him. On the way down, a magnificent Scots pine, in shape curiously similar to the Prince of Wales' feather, attracted much attention; while another Scots pine, towering to a height of 70 feet, measured 9 feet 7 inches in circumference at 5 feet up.

In the Duack valley the carriages were resumed, and the woods on Lyngarrie banks were driven through. This district was also during last century the scene of a great forest-fire, when in 1746 two and a half million trees were destroyed. A little farther east, a similar conflagration broke out in 1770, when the "fiery cross" was sent through Glen Urquhart to summon the clansmen to quench the fire. This is believed to be the last occasion on which the fiery cross was used in Scotland. Notwithstanding these extensive devastations, however, a large number of huge old trees yet remain, and the various instruments

of measurement were frequently brought into requisition. A Scots pine about a century old, and carrying one of the most beautifully-shaped heads of any pine in Scotland, measured 13 feet in girth at 3 feet up, its spread of branches being 66 feet in diameter. Another Scots pine, with the habit of an oak, girthed 20 feet round the base, 13 feet 8 inches at 4 feet up, 14 feet at 5 feet up, and 14 feet 8 inches at 6 feet up, where it begins to fork into three gigantic stems, towering to a great height, and forming a remarkably handsome head. The site was stated to be about 800 feet above sea-level. Beside this monarch was seen a magnificent weeping Scots pine, which is one of two growing in Strathspey, the second being in the Forest of Duthil. Two other Scots pines were found to possess boles of 11 feet 1 inch and 11 feet 0½ inch in circumference respectively. To the right of the road there was seen growing a fine plantation of young pines, measuring on the average from 4 to 5 feet in girth; and here also was pointed out the remains of the stump of the "King of the Forest," which must have been a gigantic tree in its prime.

The estate nurseries at The Dell were the next object to engage attention, at the entrance to which Mr Stephen had erected a handsome arch, from which flags were flying in honour of the occasion. The nurseries cover an area of about 13 acres, and contain a well-arranged and comprehensive stock of vigorous plants, for the growth of which the soil and situation seem to be remarkably well adapted. Near the entrance was seen a neatly designed summer-house, built by Mr Stephen in 1881, and in the centre of it stands a very interesting table, constructed of pieces of wood from all the various kinds of trees grown on the estate, which number about a hundred and ten varieties. After a walk round the nursery, to inspect the fine stock of young trees, all growing well and in capital order, each member of the company was invited to select from among a choice lot of young plants, that had been carefully potted and tended for the purpose, a young Scots pine as a memento of their visit to Strathspey Forests —the Scots pine being the badge of the Seafield family as well as of the Society. The Members were delighted to take advantage of the kind offer, and each Member chose his own tree, which was set aside to be handed to him at Grantown, on their departure for the south at the close of the Excursion.

At the pretty rural village of Nethy-Bridge, fast becoming a

favourite resort for health seekers, the Excursionists were served with tea in the Drill Hall. After a stroll for half an hour to see the interesting village, the Members entered their carriages, and a short drive brought them to Broomhill Station—passing, on the left, a small hillock which is said to indicate the extraordinary height reached by the river Spey in the famous flood of 1829.

Broomhill was left by train at 8.30 for Elgin, and at Grantown Station Mr Smith, Mr Grant Thomson, and other gentlemen from Grantown, left the party amid ringing cheers. The route lay along a stretch of birch and pine woods, mostly of natural reproduction, and passed on the right the favourite summer resort of Grantown, a pleasantly situated little Highland town, embosomed in the natural woodlands, and Castle Grant, standing on a commanding site in the midst of an extensive and richly-wooded demesne. Soon after the woodlands were left behind, and the line traversed Dava Moor, now a bleak, bare, and exposed upland track, over which the storms sweep with great fury, and often block the railway with snow-drifts, but which in an earlier period appears to have been covered with forests, evidence of which was seen in the exposed remains of numerous trees that lay buried in the deep peat now covering the surface. Crossing high over the deep ravine of the river Divie, at Edinkillie, the country improved in aspect at every turn. The picturesque valley of the Findhorn, and the wide extent of Darnaway Forest, the scene of an excursion of the Society in 1881, are seen on the left for some miles; and passing through the richly-wooded estate of Altyre, also visited by the Society in 1881, Forres was reached at 9.30 P.M. An ancient royal burgh, Forres stands on a pleasant and well-sheltered site, and is considered one of the healthiest places in Scotland, the natives calling it the "Montpelier of the North." In olden times it boasted a royal residence, of which some picturesque ruins are seen on the Castle Hill, a green mound at the west end of the town. The "gracious King Duncan" of Shakespeare held court here, and for several centuries afterwards it continued a royal castle, but it has long ago passed into private hands. A local bard has sung—

> ". . . Forres in the days of yore,
> A name 'mang Scotia's cities bore;
> And there the monarchs of the land
> In former days held high command."

By the time the train left Forres darkness had set in, and during the rest of the journey the surrounding country along the "Laigh of Moray" was hid from view. Elgin was reached shortly before eleven o'clock, and the Members proceeded at once to the various hotels in the town which they were to occupy during the Excursion; the "Gordon Arms" Hotel being the headquarters.

SECOND DAY.

Wednesday, 8th August.

GORDON CASTLE.

The woods and policies around Gordon Castle, the Scottish seat of the Duke of Richmond and Gordon, formed the field of inspection for the second day of the Excursion. The Members were early astir, and left Elgin by train at 7.35 A.M., arriving at their destination at a quarter past eight. The party were met and welcomed at Fochabers Station by Mr Charles Webster, gardener, and Mr John Scott, forester, on the Gordon Castle estates, and Mr William Christie, nurseryman, Fochabers, who acted in the capacity of guides during the day; their life-long acquaintance with the estate and district proving of the utmost value to the Excursionists, and making the visit to the locality most interesting to them in every way.

Walking across the fine bridge that spans the river Spey, the noble entrance gate to Gordon Castle was seen deeply recessed on the left, and on entering the clean and well-built town a little farther on, the "Gordon Arms" Hotel was reached, where breakfast was immediately served.

Before entering the grounds of Gordon Castle, the Members walked up the main street of the town to inspect the nurseries belonging to Mr Christie, through which they were conducted by the proprietor. The selection of forest and ornamental trees and shrubs was found to be in admirable condition, many rare and choice exotics being observed growing with a rich luxuriance seldom seen in more southern parts. Soil and climate appeared to be favourable to tree-life, and plants of every kind were thriving vigorously in this large and well-stocked nursery. In close proximity to the nursery stands the handsome educational

institution known as Milne's Free School, an object of much public interest. This edifice was built and endowed by a legacy of £20,000 left by a native of the town of Fochabers, Alexander Milne, who died at New Orleans in 1838.

The first part of the Gordon Castle woods to which attention was directed was that known as "Cullen Wood," situated on the hill to the east of the village. The oldest part consists entirely of Scots pine planted in 1790, and the wood has been enlarged frequently in subsequent years. The trees were found to be of very large and firm growth, and at least equally fine in quality with those visited the previous day in Strathspey. The pathway by which the party proceeded, running high along the face of the hill, gave, from its elevated position, a splendid opportunity of viewing the low-lying country and the broad expanse of Moray Firth beyond it to the north. In order that this might be the better accomplished, the trees at various points form long vistas through which, as through an elongated telescope, numerous picturesque views of sea and landscape were seen. One of these looks down upon the stately Castle, standing in the midst of its beautiful gardens, surrounded by clumps of handsome trees of many picturesque kinds, forming a truly enchanting picture. A second discloses the village of Fochabers, whose roofs alone betray its existence as they peep out from the dense mass of the foliage of the trees by which they are closely encircled. And a third brings before the eye a rich and varied panoramic landscape of the country lying far to the north, beyond the Moray Firth, whose broad waters form an admirable foreground to so charming a picture.

On reaching the Glen, which runs across the wood, the Members were struck with admiration for the large number of magnificent silver firs that there shot up their shapely stems to an immense height. A Norway spruce, the largest on the estate, and feathered to the ground, measured 10 feet in circumference. The largest silver fir was estimated to be 110 feet in height, and girthed 12 feet 4 inches at 5 feet up. On crossing the Glen, the Members again found themselves surrounded by Scots fir, of younger growth, however, than those already inspected. They were standing at about two hundred to the acre, and contained on the average about 20 cubic feet of timber. The path then led down through the wood, amidst numerous fallen trees of great size, this part seeming to have suffered very severely from the storm.

The somewhat exposed position, however, and, in some places, loose, sandy nature of the soil, no doubt rendered the trees exceedingly liable to suffer from strong gales.

The party soon emerged on the Cullen road, which gives its name to the plantation. Turning to the right, and walking along the road eastward, a newly-formed plantation of ornamental trees on the left was observed to be making capital progress, and the choice coniferous species promising to be a complete success. On the right rose Cullen Wood, which had just been inspected, and on the left the beautifully-diversified deer park, partly hidden from the passer-by by a sheltering belt of stately trees, giving the road more of the appearance of a grand avenue to a baronial mansion than a public highway. Among the trees on the left overhanging the road, a natural curiosity was observed in the shape of a thrice forked beech tree growing round a Scots pine, and so closely grasping it as to give the appearance of the pine being part of its companion.

Arriving at the east gate, where a pretty Swiss cottage serves as a lodge, the policies were now entered. Including the deer park, they extend to about 1500 acres, richly wooded in many parts with grand ancestral trees of the stateliest dimensions. In the glen to the left, the party soon found themselves among some of the tallest and finest commercial trees on the estate. These consist chiefly of beech and Scots pine, with fine straight "gun-barrel" boles, of substantial girth, and without a branch to a height of 60 to 70 feet, furnishing timber of the cleanest and best quality. The average girth of the Scots pine growing here was estimated to be about 7 feet 6 inches. Of the larger trees, the following measurements were taken:—(1) 11 feet in girth of stem, and 80 feet in height, with 40 feet of clean, straight bole; (2) 11 feet in girth; (3) 9 feet 4 inches in girth, and 60 feet of clean bole, all being girthed at the usual height of 5 feet from the ground.

On emerging from this fine wood, near to the estate sawmill, the Excursionists proceeded across the ridge of the deer park towards Cotton Hill, passing on the way several thriving clumps of ornamental trees, among which the conifers appeared to be most at home on this rather exposed ridge. Herds of deer, both fallow and red, browsing on the verdure, or scampering off on the approach of the party, lent life and animation to the scene.

Many old picturesque trees, whose stunted and gnarled forms, assuming in many cases most fantastic shapes, adorned the

summit and slopes of Cotton Hill, and lent an air of romance to the surroundings. From this elevated spot, that part of the river Spey which was forded by the ill-fated Prince Charlie on his way to meet the Duke of Cumberland at Culloden, was seen and noted with interest. From the summit of the hill a splendid view was also had of the Moray Firth, and across it to the distant hills of Cromarty, Ross, and Sutherland.

Leaving the picturesque summer-house on the top of the hill, the party proceeded down a grassy hollow in which were seen growing some remarkably fine specimens of park trees. Among them were gigantic larches and spruces, and some of the largest silver firs on the estate. A grand larch, said to be the largest in the policies, and probably one of the earliest planted larches north of the Grampians, had a huge trunk which girthed 15 feet at 5 feet up. At the foot of the hollow the party entered the "Quarry Garden," which to many of those present formed the most attractive item in the day's programme. It was at one time a freestone quarry, but had been transformed, after much labour and expense, by the late Duchess of Richmond and Gordon, into a most fascinating spot, and certainly forms a model piece of landscape gardening of almost unrivalled taste and beauty. Round its steep sides tiers of terraces have been made, while the whole was set off to the best effect with ornamental trees and shrubs, such as azaleas, rhododendrons, barberries, laurels, and other evergreens, "weeping" trees of various kinds, and choice conifers, among which were noticed handsome specimens of *Abies Douglassi*, *A. nobilis*, *Wellingtonia gigantea*, *Cupressus Lawsoniana* in variety, *Thuiopsis borealis*, *Thuja gigantea*, and others, lending a variety and charm to the scene of a most enchanting character. A grand specimen of *Abies lasiocarpa*, about 55 feet in height, and thickly clothed from base to apex with its emerald foliage, attracted special attention from the visitors. A neat tea-house crowns the summit of the western promontory of the Garden, from which a lovely bird's-eye view of the whole Garden was obtained while the party were sheltering from a heavy shower.

Leaving this charming spot, the party proceeded along the famed "Holly Banks," where many fine clumps of indigenous hollies, some of them apparently of great age, were seen and much admired, in spite of the incessant downpour of rain which had now set in, and threatened to spoil the day's programme.

One of the largest clumps contained about fifty clean-stemmed holly trees, within a space of less than 50 yards in diameter. With the rain rather increasing than abating, the party now proceeded at a sharp pace towards the castle, where they found excellent shelter in the long roomy colonnade fronting the flower gardens. Here were displayed for their inspection a number of interesting articles and timber specimens, which were leisurely examined. The specimen which attracted the greatest attention from every member of the party, was an immense slab, nearly 6 feet broad, of Scots pine, on which was fixed a brass plate with the following most interesting inscription :—

"In the year 1783, William Osbourne, Esquire, Merchant of Hull, purchased of the Duke of Gordon, the Forest of Glenmore, the whole of which he cut down in the space of twenty-two years, and built during that time at the mouth of the River Spey, where never vessel was built before, forty-seven sail of ships of upwards 19,000 tons burthen. The largest of them, of 1050 tons, and three others, but little inferior in size, are now in the service of His Majesty, and the Honble. East India Company. This undertaking was completed at the expense (for labour only) of above £70,000. To His Grace the Duke of Gordon, this plank is offered as a specimen of the growth of one of the trees in the above forest, by His Grace's obedient servant, Wm. Osbourne, Hull, Sept. 26th, 1806."

It being now past mid-day, the whole party were entertained to a substantial luncheon by His Grace the Duke of Richmond and Gordon, in one of the roomy conservatories at the castle. His Grace's commissioner, Mr Wedderspoon, presided, and Mr Aitken, factor on the estate, occupied the croupier's chair.

After the loyal and patriotic toasts were proposed by the CHAIRMAN and duly responded to; Mr METHVEN proposed the toast of His Grace the Duke of Richmond and Gordon, referring in eulogistic terms to his kindness and courtesy in giving them permission to inspect the splendid woods and policies of Gordon Castle, which they had all so greatly enjoyed, and of which they would see much more before their visit was over. He desired to convey, through Mr Wedderspoon, their most grateful thanks to His Grace for the instruction and pleasure they had all derived from their inspection that day of the grand woods and policies around Gordon Castle. He could see no necessity for what he believed to be the erroneous policy of sending students of forestry from this country

to the forests of France and Germany, when they had at home such extensive and well-managed forests as they had seen during the last two days.

Mr Wedderspoon, in thanking the Members for the hearty manner in which they had pledged His Grace's health, said that he did not know much practically about forestry, but he thought it would be a good thing if such places as Essex, for instance, where the country was often very bare and barren, were planted. They would derive many substantial advantages from it. Besides having the timber, they would have the shelter of the growing trees, and it would help much to make the landscape more interesting.

Mr Dunn then proposed the health of the representatives of His Grace the Duke of Richmond and Gordon, referring to the great trouble to which they had put themselves in order to make the visit as instructive and interesting as possible, and expressing the indebtedness of the Members for the successful result attending their labours.

Mr Aitken, factor, replied in suitable terms.

After luncheon, the weather having faired up again, the Members proceeded to conclude the remaining portion of the day's programme, but owing to the dampness of the ground after the heavy downpour of rain, the route had to be curtailed in some places.

The ducal castle was an object of great interest to the party, from the many historical associations connected with it. The original castle was founded in 1498 by the second Earl of Huntly, and was long known as the "Bog o' Gight Castle," and along with its noble owners, who were locally styled the "Guidmen o' Bog o' Gight," and the "Cocks of the North," figured prominently in the history of the country for many ages. The castle was rebuilt by the fourth Duke of Gordon about a century ago, and is a stately pile of four stories, with the original high embattled tower of the Bog o' Gight in the centre, and lower wings of two stories, presenting in all a splendid façade of 568 feet in length. Owing to the preparations, however, for the immediate arrival of the ducal family at their Highland home, the Excursionists were unable to view the magnificence of the interior. Had this been possible, the costly paintings, family portraits, sculpture, and other rare and choice works of art by eminent masters, with which it is adorned, would certainly have drawn forth the admiration of one and all.

A stroll through the extensive and beautiful flower-gardens, on the south front of the castle, was greatly enjoyed, the moist air being laden with the perfume of roses and other sweet-scented flowers. The principal garden has been laid out with much taste and skill in the Italian style, and ornamented with statues, vases, and fountains. Lawns and walks were broad and smooth, the beds and borders well and tastefully filled, and the whole in perfect order.

Passing out of the garden on the western side, the party proceeded to examine some of the noblest trees that so richly adorn the policies in the neighbourhood of the castle. Standing on the greensward of the Home Park, immediately to the westward of the castle, are many truly remarkable specimens of ornamental and timber trees, with giant stems and wide-spreading umbrageous heads, calling forth the admiration of all beholders.

A few minutes' walk across the grass brought the party to one of the most notable trees in the north of Scotland, known as "the Duchess Tree," a magnificent lime, which drew forth raptures of admiration. It is carefully protected and tended, and the boughs sweep down to the greensward all round. Beneath its ample shade the whole party of about seventy gathered round the massive fluted stem, to which the measuring tape was applied, and it was found to girth 17 feet, at 5 feet from the ground. The tree rises to a height of about 90 feet, and the gracefully drooping branches have a circumference of 114 yards. Among other trees measured were a walnut,—said to be the finest in the district,—13 feet 5 inches in girth, and 78 feet in spread of branches; a grand example of Spanish chestnut, 15 feet 7 inches in girth; a splendid beech, 16 feet 1 inch in girth; a tall stemmed beech, 13 feet 4 inches in girth; a false acacia (*Robinia*), 8 feet 3 inches in girth; a handsome old yew, 8 feet in girth; a massive horse-chestnut, 15 feet 2 inches in girth; and a gigantic black Italian poplar, girthed 15 feet 3 inches, all at 5 feet up.

The inspection of these notable trees brought the party to the head of the grand walk running south from the castle through the centre of the flower-gardens to their boundary. Here, surrounding the base of the stem of a handsome elm, and stretching out over its roots for some distance, a very artistic and beautiful design of variously-coloured pebbles has been formed, with the name of Lord G. G. Lennox neatly worked into the bordering.

The view of the gardens from this spot, with the stately castle forming the background, was greatly admired.

Proceeding next to the extensive fruit and kitchen gardens, and vineries, some time was pleasantly spent in examining their well-cultivated quarters, and the excellent crops to be seen on all sides. These gardens have long been notable for the abundance and high quality of the fruits they produce; and even in this untoward season, when many orchards and gardens display poor crops of fruit, many varieties were seen here in abundance. The same fruitful feature was observed in the vineries and other glass structures, which were all fully stored with the fruits, flowers, and plants in demand in the ducal establishment. Everything presented the appearance of skilful and successful management, and gave much pleasure to the visitors while passing through these extensive gardens.

Leaving the gardens, the walk was past the ornamental ponds to the broad and handsome avenue, which forms the main approach to the castle. Here splendid trees and luxuriant shrubberies, arranged in an informal and natural manner, adorn the spacious carriageway on either side, and at intervals between them were seen widely-sweeping expanses of the park, with occasional glimpses of the more distant landscape. Fine healthy specimens of *Abies cephalonica*, *A. nobilis*, *A. pinsapo*, *A. Nordmanniana*, *A. polita*, *A. Veitchii*, *Pinus Jeffreyii*, *P. parvifolia*, and other choice conifers, were introduced at intervals among the broad-leaved trees along this grand avenue.

The Members left the grounds by the West Gate, a handsome structure in keeping with the style of the castle, and proceeded over the Spey bridge to the railway station of Fochabers. Departing by train at 3.40 P.M., a good view of the country was obtained as the party proceeded on their way back to Elgin. The valley of the Spey presented well-cultivated fields and comfortable-looking homesteads until some distance beyond Orbliston Junction, when fine thriving plantations of Scots pine, spruce, and larch, occupied most of the ground within view, chiefly on the Duke of Fife's estates, and attracted the attention of the Members. Nearing Elgin, the country again assumed a fine agricultural aspect, and the ancient Cathedral city was reached prompt to time at 4.10 P.M.

The remaining portion of the afternoon was spent in viewing the ancient royal burgh of Elgin and its pleasant surroundings.

The beautiful ruins of the cathedral and its precincts naturally attracted the greatest attention; while the site of the ancient castle of Elgin, of which only a small portion now remains, and the handsome monument to the last Duke of Gordon, both situated on the rounded crest of the Lady Hill, with the numerous quaint old houses, and other objects of antiquarian note, served to occupy, in a pleasant and interesting way, the time still at the disposal of the company.

At 7 o'clock, the Annual Dinner of the Society was held. For greater convenience the main body dined in the Gordon Arms Hotel, and another section in the Palace Hotel. At the former Mr John Methven, senior Vice-President of the Society, presided, being supported by Lord Provost Law, of Elgin, on his right, and Mr Hugh Steuart, Town-Clerk, on his left. At the latter, Mr Buchanan, Penicuik, occupied the chair. After dinner, the whole company assembled in the Gordon Arms Hotel.

Apologies for absence were read by the Secretary, from Mr Yool, factor to the Duke of Fife, Mr Dewar, wood-manager to Lord Lovat, and others.

The usual loyal and patriotic toasts were duly pledged, Mr Steuart replying for the volunteers, and Mr Gossip, Inverness, for the navy.

The Chairman then proposed the health of the Lord Provost, Magistrates, and Town Council of the Cathedral city of Elgin. They all knew that Elgin was an important market-town as well as an educational centre for the north of Scotland, and a favourite health resort. Referring to the past, he said, that in the time of Edward I., wild boars and other animals of the chase were hunted in the primeval forests that then covered the fertile land of this district of Moray; but all that was now changed, and Elgin was the centre of one of the most important agricultural districts in Scotland. He had not himself seen better wheat in any part of the Lothians than grew in Morayshire, and they had that day seen such grand trees as could not be easily surpassed in any part of the kingdom.

Lord Provost Law, in replying, thanked them all for the cordial way in which they had responded to the toast, and he offered the Society, in the name of the citizens of Elgin, a hearty welcome to the ancient city. He then proposed the toast of the evening, "The Royal Scottish Arboricultural Society." The Society had been established about forty years ago with a small beginning

by observant men, who went about the country, in their own way, just as they were doing at the present time, to gather information about their forests and woodlands, and the various methods of managing them. They were now doing a good work, and he hoped they would go on and prosper. If they should ever return to Elgin, he hoped that they would give him timely warning, so that he might endeavour to give them a still better reception than he was able to do on this occasion.

A number of other appropriate toasts were proposed and replied to; and a pleasant evening was spent.

THIRD DAY.

Thursday, 9th August.

THE CULLEN ESTATES.

Favoured with weather of a most enjoyable nature, a refreshing breeze tempering the great heat which had prevailed during the two previous days in the north, the Members again set out from Elgin at an early hour, in order to overtake the various items on the day's programme. Elgin was left by the 6.40 A.M. train for Cullen, there to inspect the woodlands of the Countess Dowager of Seafield at Cullen House.

Shortly after leaving Elgin, the route lay almost due east, passing through a good agricultural country, well sheltered with woods and hedgerows, and said to be one of the earliest districts in Scotland. The chief landowner is the Duke of Fife, whose Morayshire residence, Innes House, lay about 2 miles off on the left, between Leuchars and Urquhart railway stations. The next object of note was the village of Garmouth, at the mouth of the Spey, which was of great interest to the arborists, as being at one time noted for its shipbuilding and extensive export of timber, which had been floated down the Spey in rafts from the forests of Abernethy, Glenmore, Glenfishie, Rothiemurchus, and others in Strathspey. When most of these forests became exhausted of their original crop of Scots pine, the timber trade and shipbuilding at the mouth of the Spey declined in importance, although there was still a considerable amount of business done in the export of local timber, and a little in shipbuilding.

The Spey was crossed by a long and substantial railway bridge, and the route was along the Banffshire coast, the Moray Firth lying on the left, past the pretty fishing villages of Portgordon, Buckie (with its 6000 inhabitants, said to be "the largest purely fishing village in Scotland"), Portessie, and Portknockie, with fine views of the sea and shore, and a well-wooded country rising inland on the right. Shortly after passing Buckie Station, the route entered the Seafield property, distinguished by the model fishing village of Ianston, which had risen up since 1879, and the houses of which, though all occupied by fishermen, resembled more the handsome villas of some fashionable watering-place.

Cullen Station was reached at 7.33 A.M., where the Excursionists were met and cordially welcomed to the estates by Mr Michie, forester, Mr Smith, gardener, Mr Beaton, land steward, and Mr Smith, architect on the Cullen estates. A short walk through the interesting and picturesque town brought the party to the "Seafield Arms" Hotel, where the Members were served to an excellent breakfast. The front of the hotel was appropriately decorated for the occasion by pine trees, forming a pretty avenue up to the entrance. After breakfast, half an hour was devoted to a walk through this well-built, clean, and charming northern royal burgh; the fisher-folk residing chiefly in the Seatown—an irregular built village lying at the foot of the cliffs, and close to the shore. The modern town occupies a fine site on the top of the cliffs, and has a handsome square or market-place in the centre, with spacious streets leading from it in various directions, all nicely edificed and attractive in appearance.

Reassembling in front of the Seafield Arms, the Members at once took their seats in the carriages for the long drive through the policies of Cullen House. Messrs C. Young Michie, forester, and Mr J. Fraser Smith, gardener, were seated in the leading carriage to act as *cicerones* to the party, and they proved veritable encyclopædias of arboreal lore, as well as adding greater interest to the visit, by their vivid description of the numerous and varied sylvan scenes that have gained for the estate a justly merited fame. The policies are entered by the Cullen Gate, which stands in a fine position at the top of the street leading direct from the centre of the town, and is a neat erection in excellent keeping with its surroundings. Bearing to the right, and driving down the fine avenue leading to the mansion, it was

seen to be bordered by a mixed but most effective plantation of elms, oaks, limes, horse-chestnuts, purple beeches, and ash trees, of about sixty years' growth, whose thick canopy of closely-set branches, meeting and intertwining with each other high overhead, formed a delightfully shaded arcade through which the drive runs, and most effectually shelters it from the fierce northern blast. On nearing the mansion, the Bin Hill, over 1000 feet high, came into view, its tree-covered slopes with rich tints of foliage, rising up from the low-lying woodlands to the summit of the hill, and forming as magnificent a piece of landscape as could be desired. Cullen House is an imposing castellated structure, founded in 1515, but much enlarged within recent years. It has, however, been all built in one style of architecture, and is most luxuriously furnished. It is picturesquely situated on a high crag overhanging a deep ravine, along the rocky bed of which flows the historical Cullen Burn, and commands a fine view of the sea and surrounding country.

Cullen Glen was crossed immediately to the west of the mansion, by the fine bridge built in 1744 at a cost of £800, by James, fifth Earl of Findlayter, and his lady, Sophia Hope. It has a handsome span of 84 feet, and a height to the roadway of 64 feet, from which a beautiful view was obtained down the rich valley. Proceeding, the route bore to the left and followed the course of the Cullen Burn up the deep ravine, with its thickly tree-clad banks, through an extensive woodland of very old and large trees, including notable specimens of beech, lime, larch, birch, Scots pine, spruce, and silver fir, many of the last with giant boles towering to an immense height. The very pretty flower-garden was noticed on the left, and the pinetum was also seen, on the right, but the inspection of them both was left till the return journey. Crossing the Cullen Burn by a handsome iron bridge, a stately ash of large dimensions was pointed out a short distance beyond on the left as we passed, and said to be 200 years old.

Passing out by the Lintmill Gate, and proceeding a short distance along a well-kept drive, the model village of Lintmill is soon reached. Here the workmen on the estate have their dwellings. In honour of the visit the village was profusely decorated with flags and evergreens. A very hearty welcome was tendered by the inhabitants, young and old, who turned out *en masse* as the cavalcade drove slowly through the exceedingly

neat and trimly kept village. The cottages had a very cosy, comfortable look about them, their walls being profusely clothed with roses, clematis, and other pretty climbers; and the neatly kept gardens, filled with excellent crops of useful vegetables, as well as a good display of flowers in front of the cottages. It was quite the beau-ideal of a rural village, and it was the unanimous opinion that it formed an important adjunct to the estate, of the greatest credit to all concerned.

Retracing our way to the Lintmill Gate, the policies were again entered, and turning to the left the home nurseries were passed on the rising ground as we crossed the Deskford Burn. A little farther, on the opposite side, the estate saw-mills were pointed out, screened from view by ivy-clad walls. Here the workmen, to the number of about thirty, were assembled in groups by the road-side, to see the cavalcade as it passed, and gave the members a lusty cheer, which was as heartily returned by them. The pinetum was soon reached on the left, in which were seen many fine specimens of coniferous and other ornamental trees and shrubs. Among the former, the following bulked largely—*Abies Douglasii*, *A. cephalonica*, *A. grandis*, *A. Menziesii*, *A. nobilis*, *Araucaria imbricata*, *Cupressus Lawsoniana*, *Thuja gigantea*, and *Wellingtonia gigantea*. The site is well sheltered, and the soil apparently suits the conifers, as they were generally in vigorous health, and formed handsome specimens.

The road now lay up the Low Glen, which was clothed, for the most part, with splendid specimens of larch and silver fir, with a sprinkling of hardwood trees scattered among them. On the right was examined the finest larch tree in the grounds; it girthed 10 feet 1 inch, and had a clean stem of fully 50 feet, containing about 170 cubic feet of timber. In the immediate proximity were grouped a number of larch trees of a size not much inferior, the largest being 9 feet 8 inches in girth, and 60 feet in length of bole. A tall larch tree, with a gracefully weeping habit, and of finely balanced proportions, was also much admired. Amongst other denizens of special note, in this unique and picturesque glen, were observed some magnificent Scots firs, whose scaly bark, hoary with mosses and lichens, betokened them of great age; also several splendid specimens of the Norway spruce, with trunks round as cylinders, straight as masts, with hoary and pendulous branches, dipping their spray in the rippling burn at their base.

The route now turned sharp up the steep hill for some distance, till the High Glen Drive was reached. It runs along the face of the Bin Hill, through a Scots pine wood, at a height of about 300 feet, affording a splendid standpoint from which to obtain fine prospects and far distant views of the Deskford district. The first object of interest met with was a magnificent silver fir, feathered to the ground, and of an almost perfect cone shape. Its stem measured 13 feet 9 inches in girth, and about 100 feet high, its massive trunk dividing into four tree-like branches as it neared the top. Not far distant on the left was seen an arboreal curiosity, in two young trees growing about 10 feet apart uniting into one, and forming an arch of about 6 feet in height. After passing on the left a plantation of natural-grown birches, the route entered the Grand View Drive, situated on the Little Bin at a still higher altitude, from whence an extensive and picturesque panorama of the surrounding country burst into view. Reaching Woodside Lodge, one of the ten entrances to the extensive policies, a splendid view was obtained of The Bin, with the monument on its top. From hence the route lay along the Rannas Drive, a beautiful avenue of five miles in length, running through a richly-wooded valley, picturesquely studded with many fine trees of Scots pine, larch, silver fir, and other sylvan denizens of the forest.

After proceeding along this drive for a short distance, the carriages turned off sharp to the left, and passing along the Deer Park Drive through rich woodlands and open pastures, the extensive kitchen and fruit gardens were soon reached. Here Mr Fraser Smith took the party in hand, and conducted them over the various hothouses and other structures for growing flowers and fruits, which were all in fine order, and well filled with the best kinds of plants and fruits. A glance through the kitchen-garden showed it to be skilfully managed and admirably cropped. In walking through the gardens, it was remarked how abundantly figs were produced on the trees on the walls in the open air, where they ripen freely in ordinary seasons, a fact that fully demonstrates the extreme mildness of the winters in this northern part of Scotland.

Leaving the fine garden, the Members proceeded towards the flower-garden, passing on their way through beautiful shrubberies, with a fine sheet of water in their midst, and from the top of Broomaleery Brae a beautiful bird's-eye view was obtained of the mansion, richly embosomed in the woods. The flower garden lies

in the bottom of the glen, near the mansion, occupying a lovely spot by the side of the Cullen Burn, and entirely closed in on every side by high banks surmounted by huge trees, which afford it splendid shelter. A magnificent specimen of *Araucaria imbricata* was seen growing here, which had been blown over by the gale of last winter, but had been replaced in its erect position; and although it was still propped up, it gave every indication of thriving, and recovering from the effects of its temporary misfortune.

On the high ground to the south of the flower-garden the Excursionists found a good deal of interest in the park, which is here thickly studded with huge trees of oak, ash, white beam, *Cedrus Deodara*, *Abies Douglasii*, and the like, that have the effect of imparting to the principal avenue, which runs through their midst, a stately and grand appearance. At the Forester's Lodge, the principal entrance gate to the mansion, and a substantial structure of about two hundred years old, Mr Michie has formed an exceedingly interesting museum of rustic, arboreal, and other natural curios, which were laid out in an effective manner for the inspection of the Members. Much time was spent in examining this very numerous and most interesting collection, and to many it formed one of the most attractive items on the programme. It included rustic chairs and tables, numerous sections of trees, cones, lichens, minerals, fossils, stuffed animals, birds, fishes, and reptiles, polished sections of wood of many kinds, and a host of other rare articles, many of them of great antiquarian and scientific interest. A slab of wood, wholly perforated with barnacles, leaving but a shell, was also examined, and much surprise was expressed by some at its extreme lightness.

Retracing our steps along the wide and beautifully kept carriage drive, as smooth and even almost as a billiard table, the mansion-house is approached on its south front, near which is pointed out the historical Monk's Tree, a famous old horse-chestnut of great age and immense size. The party proceeded along the balcony overhanging the ravine, from which beautiful vistas are had of the wimpling burn flowing among the rocks nearly 70 feet below. After walking through the fine baronial hall, hung with old family portraits and other paintings, arms, and trophies of the chase, for which the house is famed, the party proceeded to the curious old parish church, a venerable edifice, built in the shape of a cross, and which was opened for inspection. Deep

interest was taken in the quaint, old-fashioned interior, and the ancient family pew, which has been occupied by the Seafield family for many generations. Close by the church were seen a part of the beautiful ivy-clad walls which extend for several miles around the demesne. Old Cullen House, the fine residence of the chamberlain, James Campbell, Esq., standing amid its pretty gardens and neatly kept lawns, was seen near the church, as the party passed on their way to Cullen, along the well-kept avenue that leads to the entrance gate at the top of the town.

In parting from this beautifully wooded demesne, the inspection of which was so highly enjoyed by the Members, the following measurements of a few of the finest specimens of the older trees growing on the estate were kindly furnished by Mr C. Y. Michie. They were mostly taken in the year 1882 for a particular purpose, and afford a notable record of the arboreal features of the woods.

Species of Tree.	Girth at 5 feet up.	Height of Tree.
Larch, No. 1,	10 feet 11 inches	100 feet
,, No. 2,	9 ,, 8 ,,	110 ,,
,, No. 3,	8 ,, 10 ,,	70 ,,
Scots Fir, No. 1,	8 ,, 6 ,,	60 ,,
,, No. 2,	8 ,, 5 ,,	50 ,,
,, No. 3,	7 ,, 9 ,,	70 ,,
Silver Fir, No. 1,	13 ,, 9 ,,	90 ,,
,, No. 2,	11 ,, 5 ,,	110 ,,
,, No. 3,	10 ,, 5 ,,	95 ,,
Spruce, No. 1,	9 ,, 4 ,,	80 ,,
,, No. 2,	6 ,, 11 ,,	90 ,,
,, No. 3,	6 ,, 8 ,,	84 ,,
Ash, No. 1,	13 ,, 9 ,,	35 ,,
,, No. 2,	10 ,, 3 ,,	30 ,,
,, No. 3,	9 ,, 2 ,,	76 ,,
Beech, No. 1,	11 ,, 3 ,,	60 ,,
,, No. 2,	10 ,, 7 ,,	90 ,,
,, No. 3,	9 ,, 10 ,,	80 ,,
Birch, No. 1,	10 ,, 5 ,,	50 ,,
,, No. 2,	10 ,, 3 ,,	40 ,,
,, No. 3,	9 ,, 7 ,,	70 ,,
Scots Elm, No. 1,	12 ,, 0 ,,	80 ,,
,, No. 2,	10 ,, 7 ,,	80 ,,
,, No. 3,	10 ,, 7 ,,	40 ,,
Oak, No. 1,	8 ,, 0 ,,	60 ,,
,, No. 2,	7 ,, 4 ,,	70 ,,
,, No. 3,	7 ,, 3 ,,	30 ,,
Horse Chestnut, No. 1,	12 ,, 2 ,,	50 ,,
,, ,, No. 2,	8 ,, 0 ,,	40 ,,
,, ,, No. 3,	6 ,, 3 ,,	80 ,,
Spanish Chestnut, No. 1,	8 ,, 10 ,,	60 ,,
,, ,, No. 2,	8 ,, 3 ,,	70 ,,
,, ,, No. 3,	8 ,, 2 ,,	65 ,,

The "Seafield Arms" was soon reached, and here for the second time the company were entertained by the Countess Dowager of Seafield. The Members sat down to luncheon in the Town Hall, Mr Campbell, chamberlain to the Countess Dowager of Seafield, presiding, who was supported by the Council of the Society and several local gentlemen, including the Rev. W. T. P. Macdonald, parish minister, and Mr Bruce of Tochieneal.

After luncheon, the CHAIRMAN, in the name of the Countess Dowager of Seafield, welcomed them all to Cullen. Her ladyship, he said, was the largest owner of woodlands in the United Kingdom, and had taken a life-long interest in arboriculture. The late Earl of Seafield carried out planting on an extensive scale in Strathspey, which left it much fairer and richer than he found it. From these extensive plantings it can now be practically demonstrated that afforestation is the best use to which much of the land in the Highlands can be put. It would, he believed, to a large extent eventually solve the Highland problem. He thought the Seafield family deserved the thanks of the country for their spirited enterprise in afforesting so great an area in Strathspey. He then proposed the toast of the "Royal Scottish Arboricultural Society," and commended the Members for the good work they were doing. He thought that they in Scotland owed its Members a deep debt of gratitude. It was not creditable, he said, that in Scotland there was no Chair of Forestry at any of our Universities, and he thought that, seeing the Society had already contributed £400 towards the endowment of one, the Government should take the matter up, and grant the remainder of the sum required to endow the Chair.

Mr METHVEN, on behalf of the Society, begged Mr Campbell to thank the Countess Dowager of Seafield for her kindness and hospitality to the Members, and expressed the great pleasure it gave them all to have had an opportunity of inspecting the splendid policies and woodlands on the Cullen estate.

Mr METHVEN then proposed the health of the Countess, which was received with the warmest acclamation.

The toasts of the chairman, Mr Campbell, and the guides, Messrs C. Y. Michie and J. Fraser Smith, were also proposed and enthusiastically received.

The party then walked to the railway station, and taking train at 1.10 P.M., reached Elgin again in an hour afterwards.

THE FIFE ESTATES AND PLUSCARDEN PRIORY.

Immediately on the arrival of the party at Elgin, they proceeded in carriages that were in waiting at the station, to carry out the programme of the afternoon, which included an inspection of the woodlands of the estates of the Duke of Fife lying to the south and west of Elgin, and a visit to the interesting ruins of Pluscarden Priory. Mr William Gilchrist, forester to the Duke of Fife, acted with great acceptance as guide to the party during the afternoon, pointing out every object of interest, and giving valuable information about the woods and the locality, which were of the greatest service to the Members.

Driving out the western road from Elgin, a fine view was had of the Lady Hill on the right, crowned with the ruins of the ancient castle, and the handsome monument to the last Duke of Gordon, which forms a conspicuous landmark in the district. Crossing the river Lossie, the attention of the party was drawn to the richly-wooded banks of the river, stretching away to the left for a considerable distance, and which are now the property of the burgh of Elgin. The trees were of a picturesque character, and the ground admirably suited for laying out in a natural, rustic manner, with walks and roads for the recreation of the inhabitants of the town and district. Properly handled, it would form one of the most attractive of public recreation woodlands in the country. Near the top of the rising ground the Members dismounted from the carriages and entered the Oak Wood, to view a notable specimen of a weeping birch, which, after a long hunt through the rough heather and bracken, and several discoveries of the wrong tree! was at last found towards the upper edge of the wood, and much admired for its size and beautiful drooping habit. On being measured, its stem was found to girth 7 feet 5 inches at 5 feet up, with a clean bole to a height of about 15 feet, and a total height of 76 feet. Its well-furnished head of healthy drooping branches measured 55 feet in diameter, and the tree was declared to be well worthy of special attention being paid to its preservation by the municipal authorities.

Rejoining the carriages on the confines of the wood, the drive was continued along a stiff road for the horses towards the summit of Quarrywood, a plantation covering about 900 acres of a

low hill, from the top of which a magnificent view was obtained of the "Laigh of Moray," with rich fields of grain yellowing for the harvest, the district being one of the earliest in Scotland. Near the top of the hill the Millstone Quarry, famed for the number of fine specimens of fossils it has produced, was viewed with much interest; as also was the ancient Danish camp, a small circular encampment on the crest of the hill, the defending ditch of which was in good preservation. At a little distance off in the wood was seen the "bore-stone," with the usual hole in it, in which, according to local tradition, the Danish flagstaff was inserted.

Leaving the top of the hill, and its ancient and historic associations, the company proceeded at a smart pace along a woodland path, leading through a fine thriving Scots pine and larch plantation, about fifteen years old. The larch, generally, were taking the lead, and showed no sign of "bug" or "blister," from both of which the larch plantations in the district seemed to be comparatively free. Passing through a more matured plantation of well-grown timber, and descending the steep western face of the hill, the party found themselves in the Forres road, and the carriages—which had to make a long detour round the hill to reach the spot—coming up in a few minutes, the Members took their seats, and drove off for Pluscarden. The route lay through stretches of well-grown woods, in which healthy Scots pine and larch predominated, and across a cultivated country for a few miles, till the direct road from Elgin to Pluscarden was struck at the foot of Miltonbrae. Turning sharp to the right, up the valley, along a smooth level road, the drive was most picturesque and attractive, in spite of the heavy downpour of rain that had now set in, and threatened to mar the programme for the rest of the day. However, with the aid of waterproofs and umbrellas, the most of the party were able to protect themselves against the watery elements, and all maintained their buoyancy of spirits with unflagging zest through some of the most beautiful scenery to be seen in the district of Moray. Rising abruptly on the right to an altitude of 767 feet, the Heldon Hill is richly clad from base to summit in umbrageous greenery. The rain prevented any attempt to explore the interior of the woods which lay on both sides of the route, but they appeared to be nearing maturity, and on Heldon Hill the larch and Scots pine were seen to be of large dimensions and fine quality.

The picturesque ruins of the ancient Priory burst into view as a sharp corner of the road was turned, standing in the middle of a spacious haugh, round which the road sweeps on the way to the Priory. The approach to the ruins was exceedingly pretty, along a fine drive between neatly kept hedges, and, crossing the Black Burn, the party dismounted from the carriages, and quickly found shelter from the deluge which was now coming down, in the roofed portions of the venerable pile.

In one of the spacious roofed compartments, refreshments were provided for the company by His Grace the Duke of Fife, and after the long walk and drive they were much enjoyed. Mr Gilchrist presided, and in the name of the Duke of Fife heartily welcomed the Society to His Grace's domains. The toast of the Lord of the Manor was given by Mr Andrew Slater, who expressed the cordial thanks and gratitude of the Members for the kindness shown to them by the Duke of Fife, in granting permission to inspect his woodlands, and the beautiful historic Priory, where they had been so graciously entertained. The toast was enthusiastically received. Several other toasts were cordially proposed and responded to; among them the health of the Secretary, Mr W. J. Moffat, to whom the Members were so much indebted for the unflagging zeal with which he had worked to make everyone comfortable, and which had contributed so much to secure the success of the Excursion. The toast of the Chairman, Mr Gilchrist, being heartily received, the Members proceeded to view the remains of the Priory and the beautiful grounds in which they are situated.

The Priory stands in a charming spot in the lovely Vale of St Andrew, as it was called in ancient times, and is snugly sheltered on the north by the Heldon Hill, while to the south and west rise the slopes of the hill of Wangie to a height of 1020 feet, all encircled with rich woodlands. It is one of three Cistercian priories—the other two being Ardchattan in Argyle, and Beauly in Ross—in Scotland, founded by Alexander II. in the year 1230. A considerable portion of the Priory still exists in stately picturesque ruin, while the chapter-house, calefactory, and dormitories are almost entire. The latter were re-roofed by the Earl of Fife in 1821, and the dormitories, which occupy the upper story, are now used by the inhabitants of the district for a ball-room and other mundane purposes on festive occasions. The handsome square

chapter-house has a fine groined roof supported by a fluted central pillar, with floral bosses on the arches, the fine acoustic properties of which were well brought out by the Members, led by Mr James Kay, singing the Hundredth Psalm. The calefactory has also a fine vaulted roof supported by two pillars, and has been used as a place of worship for the district since 1821. At the disruption in 1843, it was presented to the Free Church, most of the members having joined that body, who still occupy it. The curious old pulpit is said to have been presented to old St Giles' Church, Elgin, in 1684, by the Lords in Council, who, it is said, at the same time presented a *gallows* to the town! The pulpit originally cost £244, but it was sold in 1826 to the Earl of Fife for £5, who placed it where it now stands. This interesting relic of the olden time, with its curious iron support for the baptismal font, and a stand for an hour-glass, were objects of much interest.

The rain having now cleared off a little, the Members gathered in a group on the lawn in front of the Priory, and were photographed, the ivy-covered ruins forming an admirable background. They then proceeded to inspect the precincts of the Priory, and the ancient gardens in which the monks cultivated the fruits and flowers of their day. In the grounds were seen a number of fine old trees, which have probably come down from monastic times; and in walking through the old garden, now well stocked as a tree and shrub nursery for the Fife estates, a venerable relic of a pear tree was seen, from which, in its prime, tradition says the monks gathered the luscious fruit. About a century ago the Priory garden was famed in the north for the excellence of the fruit it produced; but, except a few decaying fragments, the trees are now all gone. In the high old wall on the north side of the garden were seen the curious recesses in which the monks kept their bees. Some fine holly and boxwood hedges adorned the gardens, and many other objects of interest were seen about this beautiful and most interesting place, the inspection of which, in spite of the depressing influence of heavy rain, formed an enjoyable episode in the day's work, and will long be remembered by those who were present.

The day being now far advanced, the visit to Westerton House, a seat of the Duke of Fife, about 3 miles farther up the vale, and noted for the splendid larches growing near it, had to be omitted from the programme, but Mr Gilchrist courteously supplied the following measurements of a few of the finest of them.

LARCH TREES AT WESTERTON, NEAR ELGIN.

	Girth at 9 feet up.	Girth at 40 feet up.	Total Height.	Cubic Contents.
1	5 feet 0 inches	4 feet 4 inches	100 feet	98 feet
2	4 ,, 8 ,,	4 ,, 2 ,,	100 ,,	86 ,,
3	5 ,, 10 ,,	4 ,, 10 ,,	110 ,,	123 ,,
4	5 ,, 7 ,,	5 ,, 0 ,,	110 ,,	140 ,,
5	5 ,, 4 ,,	4 ,, 8 ,,	105 ,,	108 ,,
6	6 ,, 4 ,,	5 ,, 10 ,,	105 ,,	190 ,,
7	5 ,, 6 ,,	5 ,, 0 ,,	100 ,,	124 ,,
8	6 ,, 6 ,,	5 ,, 10 ,,	110 ,,	170 ,,
9	6 ,, 2 ,,	5 ,, 8 ,,	105 ,,	160 ,,
10	5 ,, 3 ,,	4 ,, 9 ,,	100 ,,	112 ,,
11	5 ,, 7 ,,	5 ,, 0 ,,	100 ,,	131 ,,
12	5 ,, 6 ,,	4 ,, 11 ,,	100 ,,	120 ,,
13	7 ,, 3 ,,	6 ,, 3 ,,	93 ,,	194 ,,
14	11 ,, 0 ,,	6 ,, 6 ,,	85 ,,	207 ,,

The rain had quite cleared off, and with the horses' heads turned for home, the drive down the valley was much enjoyed, Elgin being reached at 8 o'clock. In the evening, the Members gathered in the large hall of the Gordon Arms Hotel, and held a smoking concert, which, under the genial presidency of Mr J. A. GOSSIP, proved highly successful and enjoyable.

FOURTH DAY.

Friday, 10th August.

FROM ELGIN *VIA* FORRES TO GRANTOWN.

The Members of the Society left Elgin at the early hour of 6.15 A.M., and proceeded by train, *via* Forres, for Grantown, Strathspey, to visit the woodlands of the Countess Dowager of Seafield, at Castle Grant and neighbourhood. On the run from Elgin to Forres, a good view was had of the fertile and well-sheltered district of the Laigh of Moray, where several fields of barley were observed in stook, the first reaped grain that had been seen in the north by the Excursionists. The soil and climate of the district are among the best in Scotland, crops thrive well and ripen early, and agriculture is carried on with spirit on the most improved methods of the day. Well-built farmsteads, and neat, comfortable-looking cottages stud the plain, and the country

generally has a prosperous appearance. In passing Kinloss Station, the interesting ruins of the ancient Cistercian Abbey of Kinloss were observed standing near the railway on the right. This is said to be another of the numerous religious houses founded by David I., the "Sair Sanct for the Croon," in the year 1150. The Abbey is entirely in ruins, and comparatively little of it now remains.

Arriving at Forres, the carriages were shunted at once on to the Highland Railway, and on leaving for Grantown, the most interesting scenery at first lay on the left-hand side of the railway, where the town of Forres, Cluny Hill, with Nelson's Monument conspicuous on the summit and Cluny Hydropathic on the front of it, and the church of Rafford, with Blervie Tower in the distance, were successively passed. The line then ran for several miles through the woods of Altyre; and after passing Dunphail Station, the manse of Edinkillie was seen on the right beside the Divie, and farther on the Knock of Brae-Moray, 1493 feet, the highest hill in the lowland part of Morayshire. At Dava Station the railway entered the Strathspey property of the Countess Dowager of Seafield, which stretches in a continuous line for 20 miles to Aviemore. About a mile past Dava the summit of the hill was reached, and thereafter the train rapidly descended to Grantown. Fine glimpses of scenery were had after the line left Dava Moor—Castle Grant, and afterwards the village of Grantown, being visible on the left.

On their arrival at Grantown Station, the Excursionists were met and welcomed by Mr Grant Thomson and other friends, who were to accompany the party that day in their peregrinations through the woods. The Members immediately seated themselves in the carriages that were waiting, and drove about a mile through the town to the Grant Arms Hotel. On entering Grantown, the first impression received was the exceptionally clean and prosperous appearance of the town. Immediately on leaving the station a number of handsome new villas were passed, and in traversing the main street it was observed to be full of well-furnished shops, and commodious business and private buildings. The town doubtlessly owes much of its attractive appearance to its great repute as a health resort, crowds of people flocking to it every summer from all parts of the country, to enjoy the benefit of the bracing air and attractive scenery of Strathspey. The normal population is about 1500, but it is

increased by fully 50 per cent. at the height of the season, in the month of August. A spacious square, or market-place, some 200 yards long by 40 yards wide, adorned with trees, occupies the centre of the town. The carriages drew up on the right-hand side, at the entrance to the handsome Grant Arms Hotel, where breakfast was served in a large hall, profusely and appropriately decorated for the occasion with green boughs of Scots pine, larch, and spruce. On the wall opposite the entrance, in a conspicuous position, hung a white banner bordered with Scots pine, on which was artistically worked with small twigs the war-cry, or slogan, of the Grants, "Stand Fast, Craigellachie!"

Breakfast over, seats were taken in the carriages, and a start made with the day's programme, under the leadership of Mr Grant Thomson, whose able services and that of his assistants, as guides for the day, were highly appreciated by every member of the company. In the same manner as on the first day of the Excursion in Strathspey, Mr Grant Thomson had carefully drawn up the following itinerary to regulate the movements of the party, and it was kept to the minute.

SECOND DAY IN STRATHSPEY FORESTS.

Distance from Grantown Station.	Place.	Time.	Remarks.
Miles.	Arrive at Grantown at	8 A.M.	
1	Drive to Grant Arms,	8.20 ,,	Breakfast. Fine buildings in the town.
4	Ballieward, ...	9.30 ,,	Beautiful views. Natural larch woods.
9	Castle Grant, . . .	11 ,,	Castle. Old trees. Avenues. Gardens.
10½	Grant Arms, . . .	11.30 ,,	Half an hour for rest and luncheon.
15	Curr Wood, ...	1 P.M.	Extensive young natural Scots fir wood.
18	Craigmore Hill, . .	3 ,,	Splendid view from top. Fine old woods.
22	Grantown, ...	4 ,,	Dinner at Grant Arms. Visit the town and the Seafield Memorial Church.
23	Railway Station, . .	5.25 ,,	Leave by train for the south.

At starting, a fine view was had, along a beautiful leafy avenue, of the handsome Seafield Memorial Church, built at great cost by

the Countess Dowager in memory of her husband and son, the seventh and eighth Earls of Seafield. Going east the main street, the Ian Charles Cottage Hospital is observed on the left, a newly-erected institution of neat design and comfortable appearance, which is also a munificent gift of the Countess Dowager of Seafield to the suffering poor in the district. About half a mile beyond the town, the policies of Castle Grant are entered by a handsome baronial gate and entrance lodge, in excellent keeping with the surroundings. The demesne is of large extent, and splendidly wooded with both old and young trees and plantations. Lying, generally, between 700 and 1000 feet above the sea, it presents a great diversity of aspect, and the soil and climate appear to be remarkably well suited for the development of tree-life. Many venerable trees, hoary with age, stud the policies, and the younger plantations include a number of the hardy conifers brought from the temperate regions of the world, the most of which thrive well in this upland region, especially when sheltered from the prevailing blast by the hardy native Scots pine or the contour of the ground.

The route lay along a fine avenue, bordered with lofty Scots pines over one hundred years old, intermingled with tall spruces, silver firs, larches, and broad-leaved trees; the predominating Scots pine and heathery undergrowth being in fine harmony with the Highland character of the place. Here and there clumps of rhododendrons lent a pleasing variety to the continuous undergrowth of heather, and when in flower they must produce a charming effect. At a short distance from the drive, on the right, there were pointed out a magnificent group of three stately spruces, branched to the ground, and their conical tops towering to a height of about 80 feet.

A little farther on the Ladies' Bridge is crossed, and near it is seen the finest larches on the estate. The largest, which grows close to the bridge, was measured at 5 feet up the bole, where it was found to girth 11 feet 4½ inches, while it was fully 16 feet in circumference at the base, and it reared its massive stem aloft to a total height of about 80 feet. The soil and climate here appear to be peculiarly well suited to the growth of the larch, as was clearly demonstrated by the breadths of vigorous healthy trees through which the road lay for some distance. The beech, also, seems to thrive well, and a noticeable feature was the heavy crop of mast which the trees were bearing, reminding many of

the visitors of the heavy crop they had seen on the beeches in the New Forest, Hants, last year. A finely variegated Scots pine, on the right of the drive, was noticed in passing, and near the home farm, a splendid herd of about forty head of pedigree Highland cattle, some of which have carried off high honours in the show-yard, were seen and much admired. The route followed the course of the Millton Burn for some distance past the home farm, with fine larches and silver firs all the way.

Leaving the park by the handsome castellated gate and bridge under the Highland Railway, the road turned sharp to the right, past the neat private station, built by the railway company for the use of the Seafield family. Most of the party here dismounted, to walk and ease the horses up the long and rather steep ascent of Ballieward Hill. They were amply rewarded by the magnificent views they obtained of the surrounding country, and the grandly picturesque scenery of Strathspey and its environments. The whole of the Cairngorm range was distinctly seen in the clear air which prevailed, the broad crest of Ben Macdhui towering in all its glory in the far distance, while in the rugged corries of Braeriach and some of its giant neighbours, streaks of almost perpetual snow were clearly visible. Nearer at hand the lower hills of Glenmore and Rothiemurchus, and the widespread forests of Strathspey, formed a striking and highly attractive panorama. On each side of the road as it ascended, there were seen thriving mixed plantations of oak, lime, larch, spruce, and Scots pine. Reaching the top of the hill, the extensive woodlands of Lynemore on the right were inspected. They are formed entirely of natural-sown larch, and their freedom of growth and vigorous condition give every promise of a grand crop of timber when the trees reach their maturity. The crop has had about fifteen years' growth, and covers the ground as regularly as if it had been hand-planted, care having been taken to thin the thickets of young trees before they suffered any injury from crowding. The success of this treatment was unmistakable, and afforded a topic of much interest for discussion among the Members. In the plantation on the opposite side of the road, the natural-sown larches and Scots pines were also seen coming up among a thin crop of old trees, so that the exotic larch may be said to be now completely naturalised in these woods.

The horses' heads were here turned, and driving back for some

distance, the policies were re-entered by Ballieward Gate. The drive was continued along a well-made road, and crossing Ballieward Burn, some very fine old beeches, planes, and silver firs were seen. The railway was again crossed by a substantial bridge, and the site of the former garden was pointed out, now occupied by a crop of beeches and firs. An object of interest here was a fine group of spruce trees, raised from seed brought from Germany. A tall and handsome silver fir girthed 12 feet at 5 feet up. Near the home farm, elms of fine growth and large size were numerous, and the whole park in this locality was beautifully wooded. Near the castle was seen a young clump of fine healthy Scots pine and plane, or sycamore trees, planted on the occasion to commemorate the marriage of the Duke of York and the Princess May of Teck. Driving through a part of Heathfield Wood, notice was taken of the splendid mercantile qualities of the Scots pine trees, the fine shapely stems rising to a great height without a branch, and forming the beau-ideal of a timber tree. A large number of trees were blown down in this wood by the gale of the 17th November 1893, but they had been all sold and cleared away, so keen was the demand for wood of such a high quality. On reaching the gardens, the party were met by Mr Johnson, gardener to the Countess Dowager of Seafield at Castle Grant, who courteously showed the party over the gardens and hothouses, all well filled with excellent crops of flowers, fruits, and vegetables, and in perfect order.

Leaving the garden, the party proceeded on foot through the Millton Wood. Near the garden, a handsome Norway spruce of large dimensions attracted much attention. It stood about 75 feet high, and was closely feathered with branches from the ground to the apex, with a striking uniformity. A bee-line was taken for the castle through the Millton Wood, which is believed to be one of the oldest plantations in the policies. A number of the finest Scots pines in this wood were measured, with the following results:—(1) A splendid specimen of a "bonnet-headed" Scots pine, known as "The Earl's Tree," girthed 9 feet 6 inches at 5 feet up, and 68 feet in total height, with a clean bole 54 feet in height; (2) 10 feet 8 inches in girth; (3) 9 feet 5 inches in girth; and (4) 8 feet 5 inches in girth. The trees averaged about 85 feet in height, but one giant which was afterwards seen measured the great height, for a Scots pine, of 104 feet. Passing out of the wood, and crossing the lawn in the vicinity of the

castle, the famous lime-tree avenue was seen and examined with great interest. It was formed of two lines of very fine old lime trees. Standing closely together and meeting high overhead, their tall stems and leafy canopy gave the avenue a great resemblance to the lofty aisle of an ancient cathedral. The avenue was 150 yards long and 25 feet wide, and the trees had an average height of about 75 feet. At both ends were short cross avenues, also of lime trees of similar dimensions, the whole forming a notable feature in the princely environments of Castle Grant. Near the front of the castle was pointed out a fine Scots pine planted by the late Earl of Seafield on his fifth birthday, and promising to form in time a picturesque park tree.

Castle Grant was now reached, where the public rooms were thrown open for the inspection of the visitors. The castle, a plain castellated mansion, five stories high, stands on a commanding site, overlooking a vast extent of mountain and valley, in which the dark green of the indigenous pine forests was the predominant feature, set in a magnificent framework of the peaks and precipices of the highest and wildest mountain ranges in Britain. Part of the castle is said to be fully five centuries old, but it underwent extensive alterations and repairs at different periods, which improved the interior, but marred the former picturesquely turreted aspect of the exterior.

Passing into the entrance hall, the company were courteously shown through the rooms by the housekeeper and her assistants, who pointed out and explained the numerous objects of interest with which they were adorned. The walls and roof of the grand entrance-hall were hung with a splendid collection of arms, including the guns and pikes of the Strathspey Fencibles, and the curious swords, daggers, pistols, and targets or shields, used in Highland warfare in the olden time. Here also was seen a remnant of the "King of the Forest of Abernethy," which gave some faint idea of the enormous size attained by that gigantic Scots pine. The walls of the grand staircase and the drawing-room were hung with rare and costly pictures, and adorned with many valuable works of art. Among other articles of interest were seen the heavy and deep rowelled spurs of an ancient knight, and the strong cross-bows of mediæval warriors. The key of the house in which "Bonnie Prince Charlie" slept one night before the battle of Culloden, and the keys of Tullochgorum House and Barn, were objects of much curiosity. The dining-room, a handsome com-

partment, 47 feet by 27 feet, and about 25 feet high, contained a fine collection of portraits of the Grant family, including those of many notable personages; the breakfast-room also containing a number of those family treasures.

On leaving the castle, the Excursionists resumed their seats in the carriages, and drove off on their way to Grantown. To the left of the castle, in the deer park, were seen two small plantations of Scots pine trees, which were formed in commemoration of the extensive planting operations carried on by the seventh and eighth Earls of Seafield. In Strathspey alone, to the vast improvement of the property, these two enterprising and far-seeing noblemen planted in their time upwards of forty millions (40,000,000) of trees, besides conducting, at the same time, extensive planting operations on their other estates—Glen Urquhart, Elgin, Rothes, Keith, and Cullen. The drive led down the side of the Millton Burn, through Drumindunan Wood, 180 years of age, and the oldest plantation in the policies. In a small clump of trees on a knoll in the wood on the left, there was pointed out a pine over 100 feet high. Many other notable pines were seen in passing along, some of great size, such as the one at Lady Seafield's Seat, girthing 10 feet 10 inches at 5 feet up. By the side of the drive, and near the burn, was seen the tall Scots pine already mentioned, which had been measured and found to be 104 feet high. In this old plantation was also seen an excellent example of the system of forestry practised on the Strathspey estate, Nature being allowed to have its sway as much as possible in renewing the woods, the young natural reproduced trees being seen in large numbers, rising up on all sides, and at various ages, to replace the old trees.

Passing the deer-pond, a fine herd of deer was seen, with which the park abounds. Some interesting Druidical stones stood in a field on the left; while the Millton saw-mill and woodyard were seen on the right. Away on the left was seen Cromdale Church, where two notable beech trees grew, but which the time at the disposal of the Excursionists would not permit them to visit. Those trees were planted about one hundred and sixty years ago by the Rev. Mr Chapman, then minister of the parish, and have thriven remarkably well. They have splendid umbrageous heads, the largest measuring 90 feet in diameter, with a stout stem girthing 12 feet 10 inches at the narrowest point. The other tree, which stands only 13 feet distant, has a smaller head, but a larger stem,

which girths 13 feet 10 inches at 5 feet up, the narrowest part of the giant bole. The Grantown Golf Course was next seen alongside the road on the left, where keen players, both male and female, were busily displaying their deftness with the clubs, and trying their best to win the hole. At a little distance off the road, on the right, as Grantown was approached, Heathfield, the comfortable-looking residence of Mr J. Grant Thomson, wood-manager on the Seafield estates, was seen prettily situated in nice shrubberies and gardens, with the neat cottages and offices of the wood-manager's department near at hand; the inhabitants turning out *en masse* to give a cheer and wave a welcome to the Excursionists as they drove past. A short drive farther landed the company again at the hospitable door of the Grant Arms Hotel, where an early luncheon was partaken of, before setting out for the afternoon's work.

Luncheon finished, and seats taken in the carriages, the party were off again by noon, this time passing out of the town to the west, and driving through Kylintra Wood, a well-grown plantation, chiefly Scots pine. The road runs westward along the face of the hill near the railway, and affords many beautiful views of the Strath. The pleasantly situated house of Inverallan, the residence of J. Smith, Esq., factor on the Seafield estates, was observed snugly embowered in the woodlands close to the banks of the Spey. After passing to the upper side of the railway, a little beyond Craggan Mills, Gaich Wood was seen bordering the road on the right for about half a mile, and near its west end much interest was excited by the remarkable manner in which large Scots pines were seen clinging by their roots to the bare solid rock, without apparently a particle of earth in which the roots could run and find nourishment. Still, the trees were healthy and well-grown, showing that their long gnarled and twisted roots, which formed a network on the hard surface of the rock, must have found their way through the interstices into a more nourishing element. The Dulnain river was crossed by a fine bridge at a picturesque spot, where the road branching off to the right leads to the great Scots pine forest of Duthil on the Seafield estates, lying some miles higher up the valley beyond Carr Bridge. As the carriages drove over Dulnain Bridge, a glimpse was caught, through the trees in the valley on the right, of the picturesque ruins of Muckrach Castle, the earliest possession in Strathspey of the Grants of Rothiemurchus, being built

in 1598 by the second son of John Grant of Freuchie, but it has long been a roofless ruin.

The carriages were now left, and the company proceeded on foot up the steep face of Curr Hill, to inspect the young natural wood, which covers about 250 acres of the hill with a fine crop of Scots pine and larch. About twenty-five years ago the ground carried a heavy crop of matured timber, when a commencement was made to cut it down for estate and other purposes. According as the various portions were cleared of the old trees, the natural seedlings began to appear and soon occupied their place, till now there is seen over the whole area a fine crop of larch and Scots pine, the latter predominating. The trees are of various sizes and ages; the oldest being about twenty years of age, and having an average height of about 15 feet. Naturally they form impenetrable thickets in spots favourable to the germination of the seeds, but these will be thinned and regulated in due course. In the whole wood there was very little space seen entirely bare of seedlings, except small patches of grass, among which the pine seeds will not germinate and grow, as was observed on the first day of the Excursion in the forests on the other side of the Spey. The soil was of an open, tilly nature, and admirably suited for the growth of both larch and pine timber of the finest quality; the young crop being healthy and vigorous, and promising well for the future. The Members were greatly interested in this fine example of a self-reproduced wood, which afforded them an object-lesson worthy of their careful study, and much longer time would have been spent in it had the exigencies of the occasion permitted.

The carriages were caught up again on emerging from the wood at Curr, and the Members getting quickly into their seats, the drive was continued past Broomhill Station, and across the Spey by a wooden bridge, which was being superseded by a new one alongside of it. The old bridge was constructed of native pine timber from Abernethy forest. It had stood for over thirty years without the wood having undergone any preserving process, and only the flooring and a few piles were now showing decay. The new bridge was being built of creosoted foreign timber, which was considered somewhat out of place in the midst of plenty of native timber close at hand, and of at least as durable qualities.

Turning off to the left, Coulnakyle House and Model Farm, the pleasant summer residence of Charles B. Logan, Esq., W.S., commissioner to the Countess Dowager of Seafield, was seen on

the right. Crossing the railway, the farm of Balliemore was passed through, and the fine parish church of Abernethy was seen a little beyond, on the left, while the ruins of Castle Roy, an ancient stronghold of the Comyns, were seen standing conspicuously on a small knoll near the church. After a drive of fully three miles, the carriages were again left, and the party proceeded to scale the wooded heights of Craigmore. The Scots pine woods on this hill extend to upwards of a thousand acres, and contain many noble specimens of pines of great size and age. In ascending the hill, magnificent views were obtained at various points of the wide Strath, and the extensive forest of Abernethy, lying to the south and west. At a height of fully 900 feet above sea-level, a very large and picturesque Scots pine was seen growing, the massive bole of which measured 9 feet 11 inches at 5 feet from the ground. A curious spruce tree, about 40 feet high, attracted some notice, from its peculiar fastigiate habit, and the marked difference between the foliage of the upper and lower branches, the latter being clothed with the leaves of an adolescent plant, while the upper branches exhibited the foliage of a matured tree. Towards the summit the picturesque old Scots pines became so numerous as to form almost the sole crop, and standing up among the rank heather and tall junipers which thickly clothed the ground, they formed most interesting and romantic objects of observation to the visitors. On reaching the top of the hill, the Excursionists were welcomed by the lively strains of the bag-pipe, skilfully played by their old Highland friend, Hugh Fraser, who welcomed them with his music to Loch Garten, and had come here to meet them again. After toiling up the steep hill in the warm sunshine, the most of the party felt inclined to lie down on the plentiful crop of heather, and from that elevated point to enjoy the magnificent view which extended over the three parishes —Abernethy, Duthil, and Cromdale—that contain the greatest portion of the pine forests of Strathspey, with their grand mountainous environment.

While the main body was thus resting and enjoying the scenery, to the strains of national Highland music, a small detachment set off over the eastern slope of the hill for nearly half a mile, to view the venerable patriarch of the forest, a grand Scots pine, known by the name of "Peter Porter" (see illustration on opposite page), which attracted the attention of the eminent arborist, Sir Robert Christison, Bart., who measured it in 1880, and found it to girth

13 feet 10½ inches at 5 feet up. With Mr Stephen, the forester in charge of the wood, leading the way, the party were soon in the presence of "Peter," and admiring his stately proportions. The tape was applied to his stout stem, when it was carefully measured at several points, and noted as follows:—(1) at 1 foot from the ground it girthed 16 feet 4 inches; (2) at 4 feet up, the narrowest part of the bole, 14 feet 5 inches; and (3) at 5 feet up, 16 feet 5 inches, showing, even at the smallest girth, a goodly increase since it was measured by Sir Robert Christison thirteen years previously. The stem began to fork at 7 feet up, and carried a rugged, branchy, well-balanced top to about 50 feet high, forming a conspicuous object in the woodlands, the massive head standing clear out above the rising generations, which are not allowed to encroach on the open space around the monarch. This grand old Scots pine was said to have been once sold for a shilling! but the timber merchant thought so little of his bargain that he left the tree standing, rather than be at the cost of cutting and removing it to civilised parts. A lucky escape, which will not likely occur again, the noble old tree being now looked up to as the king of the forest, and tended with loyal care. The detachment having attained their object, quickly rejoined the party on the top of the hill, and proceeded in a body over the northern slope, down through many more splendid old picturesque pines, till the carriages were reached in Balliefurth plantation, on the road to Grantown.

Mounting to their seats again, the drive was along a fine level road, skirted on both sides by charming park-like woodlands, in which the graceful birch was the most conspicuous tree, and scented the air with its fragrance. Here and there, natural clumps of Scots pine heightened the effect, while thickets of natural pine seedlings gave promise of maintaining and transmitting the character and beauty of the scene to far distant generations. The farm of Achernack was passed standing on the right in a lovely spot, and in the grounds attached to the house was seen a handsome specimen of the copper beech, beneath the spreading branches of which tea is laid-out for Lady Seafield, when she visits the farm in the summer time. Onwards through the beautiful natural birch woods the drive was continued, passing on the right a great massive boulder, which, local tradition says, turns itself over three times when it hears a cock crow! but, judging by the thick mossy covering on the stone, it must have

been a long time since it heard a cock crow. Descending Achnagonaln hill, covered with a fine thriving birch wood, Revack shooting-lodge was seen pleasantly situated among the woodlands on the right. Anon, we pass near Inverallan House, past the Grantown Station on the Speyside branch of the North of Scotland Railway, and cross the river at Spey Bridge, a substantial structure of three arches, erected about the year 1754 by Lord Charles Hay, in connection with the great road-making operations conducted by General Wade for opening up the Highlands. A splendid view was had from off the bridge; and the drive of about half a mile farther, to Grantown, was along a picturesquely-wooded road, with a good example of the natural reproduction of pine forests on the right, where the seed-parents were standing thinly on the ground, while all over the area seedling pines were rising up thickly in all stages of growth, from the seedling of the year to young trees 8 to 10 feet high. This most enjoyable and instructive drive terminated at Grantown, where the carriages arrived, sharp to time, at 4 o'clock.

In the large hall at the Grant Arms Hotel, dinner was ready waiting the arrival of the party; the Countess Dowager of Seafield being again the hostess. The hall and tables were appropriately decked with a profusion of Scots fir and heather, while over the Chairman's seat the Union Jack floated, and the war-cry "Stand Fast, Craigellachie!" on the white banner, with the lighted Beacons in the centre, stood out with fine effect on the wall to the right. Mr Logan, W.S., the commissioner on the estates, presided, and was supported by Mr Smith, factor, Mr Grant Thomson, wood-manager, Mr Samson, Seafield estates office, and the Members of Council of the Society.

The loyal and patriotic toasts were proposed by the Chairman, and duly honoured.

The Chairman then proposed the toast of the Royal Scottish Arboricultural Society, and dwelt in a few appropriate sentences on the good work the Society was doing for the cause of forestry in this country. He also thanked them for electing him an Honorary Member, and said that he would endeavour to do his very best to deserve the honour they had conferred upon him.

In concluding, he took the opportunity to inform the Members that he had that day seen Colonel Bailey, Lecturer on Forestry,

Edinburgh University, who had been severely injured in the serious railway accident at Newtonmore Station a few days previously, and he was glad to tell them that the Colonel was progressing favourably, and had desired him to convey to them his grateful thanks for the sympathetic telegram they had sent to him on Monday, from the General Meeting at Edinburgh.

Mr Dunn, Dalkeith, in replying, spoke of the great pleasure it had given them all to be allowed to visit the rich wealth of woodlands which they had seen and inspected since they arrived in the north. They had derived pleasure and much instruction from their visit to the forests of Strathspey, and they would return to their homes with many useful hints and pleasant recollections of all they had seen. He then proposed long life, health, and prosperity to the Countess Dowager of Seafield; and, in name of the Society, tendered to her ladyship the most cordial thanks of the Members, for the great kindness and generous hospitality with which they had been treated during their sojourn on her beautiful estates.

The toast was most enthusiastically responded to by the Members, and Mr Logan replied, in kindly terms, on behalf of Lady Seafield.

Mr Alexander Milne, Edinburgh, proposed the health of the guides—Messrs Grant Thomson, Smith, Stuart, and Stephen,—and thanked them in the name of the party for their valuable services in conducting them through the forest; to which Mr Smith and Mr Grant Thomson replied.

Mr John Ireland, Edinburgh, gave the health of the Chairman. He and the other representatives of her ladyship had received them most gentlemanly and kindly. They had been treated in a noble way, and with real genuine hospitality—he would call it princely hospitality.

After dinner, the Members spent a short time in seeing the town, and then drove to the station in time to start for the south by a special train from Grantown to Perth at 5.25 P.M. At Grantown Station Mr Stephen had in readiness the small pots of young Scots pines, raised from native seed in the Dell Nurseries, which the Members had selected on Tuesday, to take with them to their distant homes all over the country, as a living memento of their visit to the pine forests on the Seafield estates in Strathspey. Bidding good-bye to their friends, the train started prompt at

the appointed time, and the run to Perth, in the shades of the evening, was safely accomplished without a stop. Continuing the journey by the 9.10 P.M. train from Perth, Edinburgh was reached punctually at half-past ten o'clock. The railway arrangements throughout had been admirably carried out by the North British Railway Company. Thus concluded one of the most successful, as well as interesting and instructive, excursions yet held by the Society.

APPENDIX.

Royal Scottish Arboricultural Society.

PATRON—HER MOST GRACIOUS MAJESTY THE QUEEN.

1.—FORMER PRESIDENTS.

YEAR.

1854. JAMES BROWN, Deputy-Surveyor of the Royal Forest of Dean.
1855. Ditto, Wood Commissioner to the Earl of Seafield.
1856. Ditto, ditto.
1857. The Right Hon. THE EARL OF DUCIE.
1858. The Right Hon. THE EARL OF STAIR.
1859. Sir JOHN HALL, Bart. of Dunglass.
1860. His Grace THE DUKE OF ATHOLE.
1861. JOHN J. CHALMERS of Aldbar.
1862. The Right Hon. THE EARL OF AIRLIE.
1863. The Right Hon. T. F. KENNEDY.
1864. ROBERT HUTCHISON of Carlowrie, F.R.S.E.
1865. Ditto, ditto.
1866. Ditto, ditto.
1867. Ditto, ditto.
1868. Ditto, ditto.
1869. Ditto, ditto.
1870. Ditto, ditto.
1871. Ditto, ditto.
1872. HUGH CLEGHORN, M.D., LL.D., F.R.S.E., of Stravithie.
1873. Ditto, ditto.
1874. JOHN HUTTON BALFOUR, M.D., M.A., F.R.SS. L. & E., Professor of Botany in the University of Edinburgh.
1875. Ditto, ditto.
1876. The Right Hon. W. P. ADAM of Blairadam, M.P.
1877. Ditto, ditto.
1878. Ditto, ditto.
1879. The Most Hon. THE MARQUIS OF LOTHIAN, K.T.
1880. Ditto, ditto.
1881. Ditto, ditto.
1882. ALEXANDER DICKSON, M.D., F.R.S.E., of Hartree, Regius Professor of Botany in the University of Edinburgh.
1883. HUGH CLEGHORN, M.D., LL.D., F.R.S.E., of Stravithie.
1884. Ditto, ditto.
1885. Ditto, ditto.

YEAR.

1886. Sir HERBERT EUSTACE MAXWELL, Bart. of Monreith, M.P.
1887. Ditto, ditto.
1888. The Right Hon. THE EARL OF HOPETOUN, Hopetoun House, Linlithgow.
1889. His Excellency The Right Hon. THE EARL OF HOPETOUN, Governor of Victoria, Australia.
1890. ISAAC BAYLEY BALFOUR, M.D., Sc.D., F.R.S., Professor of Botany in the University of Edinburgh.
1891. Ditto, ditto.
1892. Ditto, ditto.
1893. Ditto, ditto.
1894. R. C. MUNRO FERGUSON, M.P., of Raith and Novar, Raith House, Kirkcaldy, Fife.

2.—LIST OF MEMBERS.

Corrected to December 1894.

HONORARY MEMBERS.

Date of Election.

1873. BRANDIS, Sir Dietrich, K.C.S.I., Ph.D., *Ex*-Inspector General of Forests in India, Bonn, Germany.
1886. CAMPBELL, Sir James, Bart., Whitemead Park, Lydney, Gloucestershire.
1865. CLEGHORN, Hugh, M.D., LL.D., F.R.S.E., Stravithie, St Andrews, Fife (also a *Life* Member by composition).
1886. HOOKER, Sir Joseph D., M.D., K.C.S.I., The Camp, Sunningdale, Berks.
1886. JACK, Edward, St John, New Brunswick.
1886. JOHORE, The Maharajah of, Johore, Malay Peninsula.
1856. LAWSON, George, LL.D., Ph.D., Secretary for Agriculture, Government of Nova Scotia, Halifax, Nova Scotia.
1894. LOGAN, Charles B., W.S., Commissioner to the Countess Dowager of Seafield, Coulnakyle, Grantown, Strathspey.
1869. LOTHIAN, The Most Hon. the Marquis of, K.T., Newbattle Abbey, Dalkeith (also a *Life* Member by composition).
1886. LUBBOCK, Sir John, Bart., M.P., D.C.L., High Elms, Down, Kent.
1886. MICHAEL, General, C.S.I., Ascot, Surrey.
1889. SARGENT, Professor C. S., Director of the Arnold Arboretum, Harvard College, Brookline, Massachusetts, U.S.A.
1889. SCHLICH, Dr William, Professor of Forestry in the Engineering College for India, Coopers Hill, Surrey.
1886. SOUTHEY, Hon. Robert, Cape Town, Cape Colony.
1881. TEMPLE, Sir Richard, Bart., G.C.S.I., The Nash, Worcestershire.
1886. TOKAI, Tokio, Japan.

LIFE MEMBERS.

Date of Election.

1875. Acland, Sir Thomas Dyke, Bart., M.P., of Killerton, Exeter, Devon.
1883. Adam, Sir Charles Elphinstone, Bart. of Blairadam, Kinross-shire.
1874. Addington, The Right Hon. Lord, Addington Manor, Winslow, Bucks.
1883. Alexander, John, Assistant Conservator of Forests, Kandy, Ceylon.
1883. Athole, His Grace the Duke of, K.T., Blair Castle, Blair Athole.
1887. Bailey, Colonel F., R.E., Lecturer on Forestry, Edinburgh University, 7 Drummond Place, Edinburgh.
1884. Balfour of Burleigh, The Right Hon. Lord, Kennet House, Alloa.
1886. Balfour, Edward, of Balbirnie, Markinch, Fife.
1877. Balfour, Isaac Bayley, Sc.D., M.D., F.L.S., Professor of Botany, Edinburgh.
1866. Barrie, James, Forester, Stevenstone, Torrington, North Devon.
1877. Barry, John W., of Fyling Hall, Fylingdales, Scarborough, Yorks.
1884. Bates, Cadwallader John, Langley Castle, Northumberland.
1891. Bayne, Lewis, Jeannie Bank, Perth.
1871. Bell, William, of Gribdae, Kirkcudbright.
1877. Bolckow, C. F. H., of Brackenhoe, Middlesboro'-on-Tees.
1857. Borthwick, Wm., Forester, Dunnichen, Forfar.
1867. Bruce, Thomas Rae, Old Garroch, New Galloway.
1873. Brydon, John, Forester, Rothes, Elgin.
1879. Buccleuch, His Grace the Duke of, K.T., Dalkeith Park, Dalkeith.
1879. Buchanan, Charles, Overseer, Penicuik House, Penicuik.
1882. Chowler, Christopher, Gamekeeper, Dalkeith Park, Dalkeith.
1890. Christie, John, of Cowden, Dollar, Clackmannanshire.
1883. Christie, William, Nurseryman, Fochabers.
1877. Clay, J. Spender, Ford Manor, Lingfield, Surrey.
1872. Clerk, Sir George D., Bart. of Penicuik, Midlothian.
1879. Colquhoun, Andrew, 75 Buchanan Street, Glasgow.
1876. Cowan, Charles W., of Logan House, Valleyfield, Penicuik.
1892. Cowan, George, 1 Gillsland Road, Edinburgh.
1875. Craig, Wm., M.D., C.M., F.R.S.E., 71 Bruntsfield Place, Edinburgh.
1865. Cross, David G., Forester, Kylisk, Nenagh, Ireland.
1880. Curr, Henry, Factor, Pitkellony House, Muthill, Perthshire.
1884. Currie, Sir Donald, K.C.M.G., M.P., of Garth Castle, Aberfeldy.
1867. Dalgleish, John G., of Ardnamurchan, Brankston Grange, Stirling.
1876. Dalgleish, Laurence, of Dalbeath, Rutland Square, Edinburgh.
1877. Dewar, Daniel, Forester, Beaufort Castle, Beauly, Inverness.
1883. Dundas, Charles H., of Dunira, Dalchonzie, Crieff, Perthshire.
1872. Dundas, Robert, of Arniston, Gorebridge, Midlothian.
1867. Dunn, Malcolm, The Palace Gardens, Dalkeith.
1875. Eastwood, James, The Gardens, Bryn-y-Neuadd, Bangor, Wales.
1876. Edwards, William Peacock, S.S.C., 21 Hill Street, Edinburgh.
1881. Elliot, Walter, Manager, Ardtornish, Morvern, Oban, Argyle.
1879. Falconer, Dr John, St Ann's, Lasswade, Midlothian.
1891. Farquharson, A. J., Newtyle, Forfarshire.
1888. Ferguson, R. C. Munro, M.P., of Raith and Novar, Raith, Fife.
1869. Fish, David T., Bury St Edmunds, Suffolk.

Date of Election.

1874. Fitzwilliam, The Right Hon. the Earl, K.G., Wentworth, Rotherham, Yorkshire.
1885. Fleming, J. B., "Beaconsfield," Kelvinside, Glasgow.
1881. Forbes, Arthur Drummond, Millearne, Auchterarder, Perthshire.
1890. Forbes, William, Swinton, Masham, Yorkshire.
1869. Forgan, James, Forester, Bonskeid, Pitlochry, Perthshire.
1884. Foulis, Thomas, Publisher, 9 S. Castle Street, Edinburgh.
1866. France, Charles S., 11 Bridge Street, Aberdeen.
1881. Gilchrist, Wm., Forester, Leuchars, Elgin.
1856. Gough, William, Wood Manager, Wykeham, York.
1884. Graham, Wm., of Erins, Tarbert, Lochfyne, Argyle.
1874. Grant, John, Overseer, Daldowie, Tollcross, Glasgow.
1880. Grant, Sir George Macpherson, Bart., M.P., Ballindalloch Castle, Banffshire.
1867. Grimond, Alexander D., of Glenericht, Blairgowrie, Perthshire.
1880. Hare, Colonel, 32 Palmerston Place, Edinburgh.
1874. Herbert, H. A., of Muckross, Killarney, Co. Kerry, Ireland.
1884. Heywood, Arthur, Südbourne Hall, Wickham Market, Suffolk.
1871. Hope, H. W., of Luffness, Drem, Haddingtonshire.
1876. Horne, John, Director, Forests and Gardens, Mauritius.
1876. Horsburgh, John, 131 Princes Street, Edinburgh.
1869. Huth, Louis, of Possingworth, Hawkhurst, Sussex.
1884. Inglis, Alex., Greenlaw Dean, Greenlaw, Berwickshire.
1882. Jonas, Henry, Land Agent and Surveyor, 4 Whitehall, London, S.W.
1890. Kennedy, James, The Chesters, New Kilpatrick, Glasgow.
1892. Kerr, John, Farmer, Yorkston, Gorebridge, Midlothian.
1876. Leicester, The Right Hon. the Earl of, Holkham Hall, Wells, Norfolk.
1868. Leslie, Charles P., of Castle-Leslie, Glasslough, Ireland.
1874. Leslie, The Hon. George Waldegrave, Leslie House, Leslie, Fife.
1881. Leyland, Christopher, Haggerston Castle, Beal, Northumberland.
1883. Loney, Peter, Estate Agent, 22 George Square, Edinburgh.
1881. Lonsdale, Claud, Rose Hill, Carlisle.
1880. Love, J. W., c/o Mrs Boyce, Byron Street, St Kilda, Victoria, South Australia.
1875. Lovelace, The Right Hon. the Earl of, East Horsley Towers, Woking, Surrey.
1881. Lumsden, David, of Pitcairnfield, Perth.
1891. Lumsden, Hugh Gordon, of Clova, Lumsden, Aberdeenshire.
1875. Luttrell, George F., of Dunster Castle, Taunton, Somersetshire.
1874. Macdonald, Ranald, Factor, Cluny Castle, Aberdeenshire.
1884. Macduff, Alex., of Bonhard, Perth.
1879. M'Intosh, Dr W. C., Professor of Natural History, University of St Andrews, 2 Abbotsford Crescent, St Andrews.
1869. Mackenzie, Colin J., of Portmore, Eddleston, Peebles.
1872. Mackenzie, Donald F., Estate Office, Mortonhall, Edinburgh.
1893. Mackenzie, James, Forester, Faskally, Pitlochry, Perthshire.
1880. Mackenzie, Sir Kenneth, Bart., Conon House, Dingwall, Ross-shire.
1879. M'Laren, John, Marionville, Sciennes Gardens, Edinburgh.
1879. MacRitchie, David, C.A., 4 Archibald Place, Edinburgh.

Date of Election.

1857. MacTier, A. W., "Rothesay," Bournemouth, Hants.
1880. Malcolm, Lieut.-Col. F. D., R.E., 18 Queen's Gate Place, London, S.W.
1893. Maxwell, Sir John Stirling, Bart. of Pollok, Pollokshaws.
1871. Maxwell, W. H., of Munches, Dalbeattie, Kirkcudbrightshire.
1880. Mesham, Captain, Pontryffydd, Bodvari, Rhyl, Denbighshire.
1881. Michie, John, Forester, Balmoral, Ballater, Aberdeenshire.
1892. Milne, J. K., Kevock Tower, Lasswade, Midlothian.
1882. Mitchell, Francis, Forester, Harleston, Northamptonshire.
1889. Moffat, James, Assistant Factor, 48 Castle Street, Edinburgh.
1893. Nisbet, J., D.Œc., 145 Norwich Road, Ipswich, Suffolk.
1856. Portsmouth, The Right Hon. the Earl of, Eggesford, North Devon.
1887. Profeit, Dr Alexander, Her Majesty's Commissioner, Balmoral.
1878. Punchard, Frederick, Underley Estate Office, Kirkby Lonsdale, Westmoreland.
1876. Rae, William A., Factor, Murthly Castle, Perthshire.
1855. Ramsden, Sir John, Bart., 6 Upper Brook Street, London, W.
1876. Ritchie, William, of Middleton, Gorebridge, Midlothian.
1879. Robertson, Donald, Forester, Novar, Evanton, Ross-shire.
1866. Robertson, Jas., Wood Manager, Panmure, Carnoustie, Forfarshire.
1890. Robinson, William, 37 Southampton Street, Strand, London.
1883. Rollo, The Hon. Wm. Chas. Wordsworth, Master of Rollo, Duncrub Park, Dunning, Perthshire.
1872. Rosebery, The Right Hon. the Earl of, Dalmeny Park, Edinburgh.
1854. Rutherford, James, Agent, Kirkleatham, Redcar, Yorkshire.
1894. Sanderson, Wm., Talbot House, Ferry Road, Leith.
1867. Scott, Daniel, Wood Manager, Darnaway, Forres.
1877. Smith, Thomas Valentine, of Ardtornish, Morvern, Argyleshire.
1882. Smythe, David M., of Methven Castle, Perth.
1893. Smythe, Francis Henry, 15 Thirlestane Road, Edinburgh.
1889. Somerville, Dr William, B.Sc., F.R.S.E., Professor of Agriculture and Forestry, Durham College of Science, Newcastle.
1883. Sprot, Major Alexander, of Garnkirk, Chryston, Glasgow.
1873. Stair, The Right Hon. the Earl of, Lochinch, Castle Kennedy, Wigtownshire.
1892. Stewart, Sir Mark J., Bart., M.P., of Southwick, Kirkcudbrightshire.
1880. Sutherland, Evan C., of Skibo Castle, Dornoch, Sutherland.
1883. Sutherland, His Grace the Duke of, Dunrobin Castle, Golspie.
1865. Talbert, Peter, Forester, Glenericht, Blairgowrie, Perthshire.
1887. Taylor, Andrew, 11 Lutton Place, Edinburgh.
1877. Terris, James, Factor, Dullomuir, Blairadam, Kinross-shire.
1880. Thomson, Alexander, Trinity Grove, Trinity Road, Edinburgh.
1855. Thomson, John Grant, Wood Manager, Grantown, Strathspey.
1872. Trotter, Colonel, R.A., The Bush, Roslin, Midlothian.
1883. Trotter, Colonel H., of Mortonhall, Edinburgh.
1872. Urquhart, B. C., of Meldrum, Aberdeenshire.
1878. Walker, Major I. Campbell, Conservator of Forests, Forest Office, Madras.
1871. Wemyss, Randolph Gordon Erskine, of Wemyss and Torrie, Fife.
1869. Wild, Albert Edward, Conservator of Forests, Punjab, India.
1889. Wilson, David, jun., of Carbeth, Killearn, Glasgow.

ORDINARY MEMBERS.

The Names printed in italics are those of Members whose present Addresses are unknown. Any information regarding those Members will be gladly received by the Secretary.

Law V. Members in arrear shall not receive the *Transactions* while their Subscriptions remain unpaid. Any Member whose Annual Subscription to the Society remains unpaid for three years shall cease to be a Member of the Society, and no such Member shall be eligible for re-election till he shall have paid up his arrears.

Date of Election.

1892. Adamson, C., Merchant, Leven, Fife.
1892. Aird, Archibald, Assistant Forester, Scone, Perth.
1881. Airlie, The Right Hon. the Earl of, Cortachy Castle, Forfarshire.
1878. Aitken, Andrew Peebles, M.A., Sc.D., Professor of Chemistry, Veterinary College, Clyde Street, Edinburgh.
1891. Alexander, Jas., The Gardens, Revesby Abbey, Lincolnshire.
1865. Allan, John, Forester, Dalmeny Park, Edinburgh.
1883. Anderson, David, Forester, Jardine Hall, Lockerbie, Dumfriesshire.
1887. Annand, Adam, Forester, Brucklay Castle, Aberdeenshire.
1887. Annand, John F., Assistant Forester, Royal Botanic Garden, Edinburgh.
1872. Annandale, Robert B., Adderley Lodge, Market Drayton, Shropshire.
1883. Argyll, His Grace the Duke of, K.T., LL.D., D.C.L., F.R.S., F.G.S., Inveraray Castle, Argyleshire.
1860. Austin & M'Aslan, Nurserymen, Buchanan Street, Glasgow.

1892. Baillie, Thomas, Assistant Forester, Garth Estate, Tomnacroich, Fortingall, Perthshire.
1880. Balden, John, Dilston, Corbridge-on-Tyne, Northumberland.
1886. Balfour, John, of Balbirnie, Markinch, Fife.
1889. Balfour, John, The Gardens, Stravithie, St Andrews, Fife.
1892. Ballingall, Neil, Sweet Bank, Markinch, Fife.
1867. Barrie, David, Forester, Comlongan Castle, Annan, Dumfries.
1882. Barrie, John, Land Steward, Gateforth Hall, Selby, Yorkshire.
1889. Barron, John, Elvaston Nurseries, Borrowash, Derby.
1874. Barton, James, Forester, Hatfield House, Herts.
1892. Barty, Rev. D., The Manse, Kirkcolm, Stranraer.
1871. Baxter, Robert, Forester, Dalkeith Park, Dalkeith.
1894. Baxter, Wm., Estate Office, Mertoun, St Boswells.
1894. Beech, George, Assistant Gardener, Mortonhall, Midlothian.
1883. Bell, Andrew, Forester, Culford, Bury St Edmunds.
1890. Berridge, W., Forester, Stoneleigh Abbey Farm, Kenilworth.
1889. Berry, Francis, Forester, Culquoich, Inverkindie, Aberdeenshire.
1893. Berry, James, The Strand, Berwick-on-Tweed.
1869. Bissett, William S., Overseer, Moncreiffe House, Perth.

Date of Election.

1889. Blair, Peter, The Gardens, Trentham, Stoke-on-Trent, Staffordshire.
1883. Blake, Jas., Forester, Mortonhall, Liberton, Midlothian.
1854. Boa, Andrew, Land Steward, Dalton House, Newcastle-on-Tyne.
1872. Boa, Andrew, jun., Sub-Agent, Great Thurlow, Newmarket, Suffolk.
1892. Bond, Thomas, Forester, Cummertrees, Dumfriesshire.
1876. Booth, John, 114 Kurfursteadain, Berlin.
1887. Boulger, Professor, 18 Ladbroke Grove, London.
1883. Boyd, John, Forester, Pollok Estate, Pollokshaws, Glasgow.
1889. Britton, Horatio A., Timber Valuer, 6 Birch Street, Wolverhampton.
1860. Brodie, James, Land Steward, Glasslough, Armagh, Ireland.
1878. Brown, J. A. Harvie, of Quarter, Dunipace House, Larbert.
1887. Brown, J. R., Wentworth Nurseries, Hexham, Northumberland.
1889. Brown, P. S., Tayview, Broughty Ferry, Dundee.
1893. Brown, Robert, Forester, Castle Craig, Dolphinton, Peeblesshire.
1883. Browning, John M., The Gardens, Dupplin Castle, Perth.
1893. Brownlie, Alexander, Wood Merchant, Earlston, Berwickshire.
1873. Buchan, Alexander, A.M., F.R.S.E., Secretary of the Scottish Meteorological Society, 42 Heriot Row, Edinburgh.
1894. Buchan, R., Overseer, Guy's Cliff, Warwick.

1894. Cabry, Tom, Nisbet Hill, Duns.
1887. Cadell, George, Langley House, Langley Avenue, Surbiton, Surrey.
1890. Campbell, Alexander, of Auchindarroch, Lochgilphead, Argyle.
1889. Campbell, Colin, Agent, Bretby Park, Burton-on-Trent.
1865. Campbell, James, of Tillichewan Castle, Dumbartonshire.
1894. Campbell, John, Timber Merchant, Inverness.
1883. Campbell, John Macnaught, C.E., F.Z.S., Assistant Curator, City Museum, Kelvingrove Park, Glasgow.
1892. Chapman, Andrew, Breckonhill, Lockerbie, Dumfriesshire.
1892. Chapman, Mungo, Gardener, Easter Duddingston Lodge, Portobello.
1884. Christie, Alex. D., The Gardens, Ragley, Alcester, Warwickshire.
1887. Clark, Alexander, 226 High Street, Linlithgow.
1890. Clark, Charles, Forester, Cawdor Castle, Nairn.
1891. Clark, John, Forester, Haddo House, Aberdeen.
1892. Clark, John, jun., Haddo House, Aberdeen.
1892. Clark, William, 66 Queen Street, Edinburgh.
1890. Cockburn, Philip, 2 Darnley Terrace, Shawlands, Glasgow.
1893. Cole, James, Manager, Forest Hill Nurseries, London, S.E.
1893. Collins, Ernest, Assistant Forester, Lilleshall, Newport, Salop.
1893. Collins, Frederick, Assistant Forester, Trentham, Stoke-on-Trent.
1882. Collins, Robt. T., Forester, Trentham, Stoke-on-Trent, Staffordshire.
1887. Cook, Alfred, Forester, Empingham, Stamford, Lincolnshire.
1887. Cook, James, Land Steward, Arniston, Gorebridge, Midlothian.
1894. Cook, James, jun., Estate Office, Craigielaw, Longniddry.
1879. Coupar, Robert, Forester, Ashford, Cong, County Galway, Ireland.
1858. Cowan, James, Forester, Bridgend, Islay, Argyleshire.
1872. Cowie, John, Assistant Forester, Mountstuart, Rothesay.
1894. Cowie, John, Forester, Meikleour, Perth.
1874. Cowper, R. W., Gortanore, Sittingbourne, Kent.

Date of Election.

1875. Crabbe, David, Forester, Cortachy Castle, Kirriemuir, Forfarshire.
1867. Crabbe, James, Forester, Glamis Castle, Forfarshire.
1893. Craig, John, Banker, Dalkeith, Midlothian.
1876. Cromb, James, Assistant Forester, Kelly Castle, Arbirlot, Arbroath.
1887. Cumming, Allan, Blair Walker, Blair Athole.
1868. Cunningham, John, Forester, Ardross, Alness, Ross-shire.
1894. Cunningham, W. M., Nurseryman, Elgin.
1893. Curr, W. S., Factor, Ninewar, Prestonkirk.

1891. Daglish, John, Rothley Lake, Cambo R.S.O., Northumberland.
1884. Dalziel, James, Forester, Culzean Castle, Maybole, Ayrshire.
1869. Daniels, Peter, Forester, Slindon Hall, Arundel, Sussex.
1894. Darling, David C., Nurseryman, Aberdeen.
1874. Davidson, George, Land Steward, Carriden, Linlithgow.
1865. Davidson, John, Agent, Greenwich Hospital Estates, Haydon Bridge, Northumberland.
1857. Davidson, John, Forester, Aldbar, Brechin, Forfarshire.
1892. Davidson, John, Forester, Dalzell, Motherwell, Lanarkshire.
1892. Davidson, William, Forester, Royal Botanic Garden, Edinburgh.
1884. Deane-Drake, Joseph Edward, Stokestown House, New Ross, Ireland.
1892. Dick, Robert, Estate Foreman, Sarsden, Chipping Norton, Oxon.
1889. Don, John, Seedsman, Chapel Bar, Nottingham.
1891. Donald, A. S., Forester, Philiphaugh, Selkirk.
1893. Donaldson, George, Timber Merchant, Leven, Fife.
1893. Donaldson, James, Timber Merchant, Tayport, Fife.
1884. Doughty, Wm., Forester, Langholm Estate, Canonbie, Dumfriesshire.
1882. Douglas, Captain Palmer, of Cavers, Hawick.
1887. Douglas, Robert, 64 Princes Street, Edinburgh.
1892. Dow, R., Forester, Douglas Castle, Douglas, Lanarkshire.
1867. Dow, Thomas, Forester, Bretby, Burton-on-Trent, Derbyshire.
1862. Drummond & Sons, William, Nurserymen, Stirling.
1875. Duncan, James, Land Steward, Glack, Old Meldrum.
1889. Duncan, J. W., Somerville Place, Broughty Ferry, Dundee.
1873. Durward, Robert, Manager, Blelack, Dinnet, Aberdeenshire.
1894. Duthie, W. G., Forester, Bargany, Girvan, Ayrshire.

1885. Eddington, Francis, Overseer, Monk Coniston Park, Lancashire.
1893. Elder, William, Forester, Cholmondeley Park, Malpas, Cheshire.
1892. Elliot, John, Assistant Forester, Scone, Perth.
1894. Emslie, William, Kintore Nurseries, Kintore, Aberdeenshire.
1887. Erskine, William, of Oaklands, Trinity, Edinburgh.
1873. Ewing, David, Forester, Strichen House, Aberdeen.

1894. Farquharson, James, Forester, Ardgowan, Inverkip.
1880. Fergusson, Sir James Ranken, Bart., Spitalhaugh, West Linton.
1894. Fernie, Robert, Assistant Forester, Donibristle, Fife.
1893. Finlayson, Alexander, Royal Botanic Garden, Edinburgh.
1893. Finlayson, Malcolm, Solicitor, Crieff, Perthshire.

Date of Election.

1891. FIRTH, W. M., Timber Merchant, 19 Montpelier, Edinburgh.
1869. FISHER, William, Estate Agent, Wentworth Castle, Barnsley, Yorkshire.
1884. FLEMING, John, Albert Saw-Mills, Aberdeen.
1893. FLEMING, Rev. J., The Manse, Mordington, Berwick.
1890. FORBES, Arthur C., Wood Manager, Bowood, Calne, Wiltshire.
1893. FORBES, John M., Farnham Royal, Slough, Berks.
1878. FORBES, Robert, Overseer, Clova, Lumsden, Aberdeenshire.
1891. FOREMAN, Frederick, Nurseryman, Eskbank, Dalkeith.
1892. FORGAN, James, Sunnybraes, Largo, Fife.
1892. FORGAN, William, Assistant Forester, Heather Bank, Lynedoch Road, Perth.
1884. FORREST, Thomas, Assistant Forester, Dalzell Home Farm, Motherwell.
1889. FORSTER, William A., Forester, Belgrave Lodge, Pulford, Wrexham.
1878. FORSYTHE, John M., 47 Well Court, Dean, Edinburgh.
1892. FRASER, George, 24 St Andrew Square, Edinburgh.
1857. FRASER, P. Neill, of Rockville, Murrayfield, Edinburgh.
1892. FRASER, Simon, Forester, Boiden, Luss, Dumbartonshire.

1878. GALLETLY, James, Overseer, Bonhard, Perth.
1874. GALLOWAY, George, Estate Offices, Woodhouses, Whitchurch, Salop.
1893. GALLOWAY, Robert, 48 Castle Street, Edinburgh.
1892. GIBSON, William, Overseer, Kildonan, Barrhill, Ayrshire.
1870. GILBERT, James, Forester, Gallovie, Kingussie.
1887. GILBERT, W. Matthews, The *Scotsman* Office, Edinburgh.
1894. GILLESPIE, James, Assistant Forester, Mortonhall, Liberton.
1894. GILMOUR, Captain Robert Gordon, of Craigmillar, The Inch, Midlothian.
1893. GILROY, John, 19 Sandgate, Berwick-on-Tweed.
1880. GLEN, David A., Forester, Croxteth Park, Liverpool.
1893. GLEN, Thomas, The Gardens, Worth Park, Crawley, Sussex.
1893. GOLDIE, George, Eskdale Lodge, Dalkeith, Midlothian.
1887. *Gomersall, Edward, Forester, Moor Crichel, Wimborne, Dorset.*
1892. GORDON, George, Assistant Forester, Scone, Perth.
1893. GORDON, John G., 48 Castle Street, Edinburgh.
1891. GORRIE, G. H., Estate Office, Dalkeith, Midlothian.
1868. GOSSIP, James, of Howden & Co., The Nurseries, Inverness.
1882. *Gow, Robt., Assistant Forester, Raith, Kirkcaldy, Fifeshire.*
1887. GRANT, Alexander, Assistant Forester, Knocks, Birkhall, Ballater.
1882. *Grant, Alex. M'D., Assistant Forester, Newton, Winchburgh.*
1867. GRANT, Donald, Forester, Drumin, Ballindalloch, Banffshire.
1873. GRANT, James, Forester, Heath, Chesterfield, Derbyshire.
1893. GRANT, John B., Forester, Glenbost, Ballindalloch.
1893. GRANT, Peter, Assistant Forester, Ovenstone, Forfar.
1892. GRANT, Peter, Forester, Hornby Castle, Hornby, Lancaster.
1883. GREEN, Arthur A., 20 Annandale Street, Edinburgh.
1893. GREENFIELD, William A., Newton, Winchburgh, Linlithgowshire.
1890. GREENWOOD, C. H., Assistant Forester, Welbeck, Worksop, Notts.
1872. GREIVE, James, Messrs Dicksons & Co.'s Nurseries, Pilrig, Edinburgh.
1888. GRIEVE, James, Waterloo Hotel, Edinburgh.
1894. GRIMES, Ernest, Assistant Forester, Welbeck, Worksop, Notts.

Date of Election.

1879. HADDINGTON, The Right Hon. the Earl of, Tyninghame, Prestonkirk.
1880. HADDON, Walter, Solicitor, Royal Bank, Hawick.
1882. HAMILTON, Donald C., Forester, Knowsley, Prescot.
1873. HAMILTON, John B. Baillie, of Arnprior, Cambusmore, Callander.
1889. HANKINS, Charles, Forester, Grimsthorpe, Bourne, Lincolnshire.
1892. HANNAH, George, Forester, The Glen, Innerleithen, Peeblesshire.
1892. HARDIE, D., Dalzell Farm, Motherwell, Lanarkshire.
1890. HARDIE, James F., Forester, Donibristle, Aberdour, Fife.
1891. HARDIE, J. W., 12 Baltic Street, Leith.
1894. HARVEY, James, The Gardens, Mortonhall, Liberton.
1893. HATCHER, Bertram, Assistant Forester, Lilleshall, Newport, Salop.
1880. HAVELOCK, W. B., The Nurseries, Brocklesby, Ulceby, Lincolnshire
1892. HAY, John, Overseer, Birchhill Cottage, Clackmannan.
1889. HAYES, John, Overseer, Dormont, Lockerbie, Dumfriesshire.
1869. HAYMAN, John, Glentarff, Ringford, Kirkcudbrightshire.
1866. HENDERSON, Arch., Forester, Clonad Cottage, Tullamore, King's County.
1871. HENDERSON, John, Overseer, Vogrie, Ford, Dalkeith.
1893. HENDERSON, R., 4 High Street, Penicuik, Midlothian.
1883. HENDERSON, W., The Gardens, Balbirnie, Markinch, Fife.
1893. HENDERSON, William, Forester, Castlecower, Co. Kilkenny, Ireland.
1878. HENRY, Kennedy, Forester, Craighall, Rattray, Blairgowrie.
1894. HENRY, Robert, Assistant Forester, Ardgowan, Inverkip.
1893. HERDMAN, George, Factor, The Glen, Innerleithen, Peeblesshire.
1892. HERON, James, The Gardens, Pollok House, Pollockshaws, Glasgow.
1871. HETHERTON, Walter, Forester, c/o Little & Ballantyne, Carlisle.
1866. HOGARTH, James, Forester, Culhorn, Stranraer, Wigtownshire.
1884. *Hogg, Andrew, Forester, Castle Fraser, Kemnay, Aberdeenshire.*
1874. HOME, Edward, Assistant Forester, Whiterig, Ayton, Berwickshire.
1892. HONEYMAN, Thomas, Factor, Chimes, Auchnacarris, Fort William.
1880. HOPETOUN, His Excellency the Right Hon. the Earl of, Governor of Victoria, Australia.
1876. HULL, Frank, Forester, Lilleshall, Newport, Salop.

1893. INGLIS, John, Forester, Kelly, Wemyss Bay, Renfrewshire.
1891. INGLIS, William, Forester, Brodick, Isle of Arran.
1870. IRELAND, J. S., Nurseryman, Edinburgh.
1893. IRONS, John, Estate Bailiff, Thorney, Peterborough.
1886. IRVINE, Daniel, Overseer, Eastwood, Dunkeld, Perthshire.

1887. JACK, Donald, Forester, Garvagh, Londonderry.
1893. JACK, George, S.S.C., Dalkeith, Midlothian.
1883. JOHNSTON, Robert, Forester, Somerley, Ringwood, Hants.
1878. JOHNSTONE, Adam, Forester, Coollattin, Shillelagh, County Wicklow.
1888. JONES, James, Wood Merchant, Larbert, Stirlingshire.
1893. JONES, Thomas Bruce, Wood Merchant, Larbert.

1867. KAY, James, Wood Manager, Bute Estate, Rothesay, Bute.
1870. KEIR, David, Forester, Ladywell, Dunkeld, Perthshire.
1876. KELMAN, John, Forester, Esslemont, Ellon, Aberdeenshire.

Date of Election.

1882. KENNEDY, John, Forester, Flakebridge, Appleby, Westmoreland.
1882. KENNEDY, Walter, Forester, New Tarbet, Parkhill, Ross-shire.
1872. KENNEDY, William, Overseer, Glen Carradale, Greenock.
1887. KER, R. D., Writer to the Signet, 50 George Street, Edinburgh.
1893. KERR, Joseph, Estate Bailiff, Bower Ashton, Clifton, Bristol.
1870. KIDD, James B., Forester, Dunrobin Estates, Golspie.
1894. KIDD, Wm., Forester, Harewood, Leeds.
1879. KINCAIRNEY, The Hon. Lord, 6 Heriot Row, Edinburgh.
1894. KING, William G., King's Mills, Elgin.
1883. KINNEAR, Alex., Forester, Galloway House, Garlieston, Wigtownshire.
1876. KYRKE, R. V., of Penywern, Mold, Flintshire.

1890. LAIRD, David P., of Laird & Sons, 17 Frederick Street, Edinburgh.
1885. LAIRD, James W., of W. P. Laird & Sinclair, 73 Nethergate, Dundee.
1894. LAMINGTON, The Hon. Lord, Lamington, Lanarkshire.
1873. LAURISTON, Alexander, Rufford Nursery, Ollerton, Newark, Notts.
1890. LAWRENCE, W., Assistant Forester, Stockeld Park, Wetherby, Yorks.
1874. LEIGH, William, of Woodchester Park, Stonehouse, Gloucestershire.
1880. LEISHMAN, John, Manager, Cavers Estate, Hawick, Roxburghshire.
1893. LEVEN, George, Forester, Royal Botanic Garden, Edinburgh.
1879. LINDSAY, Robert, Curator, Royal Botanic Garden, Edinburgh.
1883. LOCH, Sir Henry B., K.C.B., Governor of Cape Colony, South Africa.
1894. LUMSDEN, Fredk. R., Newburn, Largo, Fife.

1892. MACBEAN, Simon, Forester, Bunchrew, Inverness.
1894. M'CALLUM, Edward, Forester, Falkland Palace, Fife.
1894. M'CLOWNIE, John, The Residency, Zomba, British Central Africa.
1872. *M'Coll, James M., Factor, Craignish Castle, Lochgilphead, Argyleshire.*
1870. M'CORQUODALE, D. A., Bank of Scotland, Carnoustie, Forfarshire.
1893. M'COUBRIE, M. S., Land Steward, Tullamore, King's County, Ireland.
1890. M'CRAE, Alexander, Forester, Peplow, Market Drayton, Salop.
1894. M'CULLOCH, Christopher, Assistant Forester, Ardgowan, Inverkip.
1887. M'CULLOCH, James, Forester, Gala House, Galashiels, Selkirkshire.
1893. MACDONALD, George, Assistant Forester, Innes House, Elgin.
1894. M'DONALD, James, Forester, Kinnaird Castle, Brechin.
1894. M'DOUGALL, Alex., Assistant Forester, Boughton, Kettering.
1879. M'DOUGALL, Alex., Forester, Drumbuie Lodge, Dunkeld.
1892. M'DOWALL, James, The Gardens, Kildonan, Barrhill, Ayrshire.
1882. M'FARLANE, John, Forester, Tarbet, Loch Lomond, Dumbarton.
1890. M'GEE, John, Assistant Forester, Bute Estate, Rothesay, Bute.
1871. M'GRATH, Patrick, Forester, Galtee Castle, Mitchelstown, Tipperary.
1890. M'GREGOR, A., The Schoolhouse, Penicuik, Midlothian.
1878. M'GREGOR, Duncan, Forester, Camperdown, Dundee.
1893. M'GREGOR, R., Assistant Forester, Lynedoch, Perth.
1893. M'HATTIE, J. W., The Gardens, Strathfieldsaye, Winchfield, Hants.
1894. M'ILWRAITH, Wm., Assistant Forester, Ardgowan, Inverkip.
1880. M'INTOSH, A. G., Forester, Brookman's Park, Hatfield, Herts.
1885. MACINTOSH, William, Drummuir Estate Office, Keith.
1882. M'INTYRE, John, Wood Merchant, Cardross, Dumbartonshire.
1892. M'KAY, Allan, Assistant Forester, Dunrobin, Golspie, Sutherland.

Date of Election.

1884. M'Kay, James, Forester, Breadalbane Estates, Killin, Perthshire.
1875. Mackay, John, Lauderdale Estate Office, Wyndhead, Lauder.
1887. Mackay, Peter, Assistant Forester, Colzium Estate, Kilsyth.
1891. Mackendrick, James, Forester, Brodie Castle, Forres.
1894. Mackenzie, Alex., Assistant Forester, Altyre, Forres.
1867. Mackenzie, Alex., Warriston Nursery, Inverleith Row, Edinburgh.
1882. Mackenzie, Sir Alex. Muir, Bart. of Delvine, Dunkeld.
1867. Mackenzie, John Ord, of Dolphinton, W.S., 9 Hill Street, Edinburgh.
1894. Mackenzie, John R., Assistant Forester, Altyre, Forres.
1892. Mackenzie, W. A., Assistant Factor, Strabane, Brodick, Arran.
1882. Mackie, James H. J., Land Steward, Invermay, Dunning, Perthshire.
1883. M'Kinnon, George, The Gardens, Melville Castle, Lasswade.
1892. M'Kinnon, William, Nurseryman, 144 Princes Street, Edinburgh.
1878. Mackintosh, The, of Mackintosh, Moy Hall, Inverness.
1879. M'Laren, Charles, Land Steward, Cally Lodge, Dunkeld.
1878. M'Laren, John T., Overseer, Kennet, Alloa, Clackmannanshire.
1893. M'Laren, William, Forester, Altyre, Forres, Morayshire.
1866. M'Lean, William, Forester, Eglinton Castle, Irvine, Ayrshire.
1865. M'Lellan, Duncan, 7 Kelvingrove Terrace, Glasgow.
1892. M'Lennan, William, Factor, Prestondene, Ford, Dalkeith.
1874. M'Leod, Angus A., Superintendent of City Gardens, 14 Royal Exchange, Edinburgh.
1893. M'Leod, James F., The Gardens, Dover House, Roehampton, London, S.W.
1883. M'Leod, John, of Dickson & Turnbull, 26 George Street, Perth.
1893. M'Nicoll, John, Assistant Forester, Kelly, Wemyss Bay.
1892. MacOwan, Daniel, Assistant Forester, Hornby Castle, Lancaster.
1894. Macpherson, Alex., Assistant Forester, Altyre, Forres.
1892. M'Rae, Alexander, c/o J. M. Bennett & Sons, Ardwick Station, Hyde Road, Manchester.
1884. Main, Adam, Forester, Loftus R.S.O., Yorkshire.
1894. Malloch, William, 50 South Street, Perth.
1893. Marshall, J. Z., Timber Merchant, Bo'ness, Linlithgowshire.
1876. Martin, James, Forester, Knipton, Grantham, Lincolnshire.
1884. Massie, William H., of Dicksons & Co., 1 Waterloo Place, Edinburgh.
1893. Mather, R. V., of Laing & Mather, Nurserymen, Kelso.
1893. Matheson, Donald, Assistant Forester, Kelly, Wemyss Bay.
1894. Maughan, John, Estate Agent, Jervaulx Abbey, Bedale, Yorks.
1886. Maxwell, Sir Herbert E., Bart. of Monreith, M.P., Wigtownshire.
1891. Maxwell, James, Forester, Ruglen, Maybole.
1879. Meikle, R. A., Ri Cruin, Lochgilphead, Argyleshire.
1889. Melville, The Right Hon. Viscount, Melville Castle, Lasswade.
1873. Menzies, George, Agent, Trentham, Stoke-on-Trent, Staffordshire.
1877. Methven, Henry, of Thomas Methven & Sons, 15 Princes St., Edinburgh.
1892. Methven, John, The Gardens, Blythswood, Renfrewshire.
1869. Methven, John, of Thomas Methven & Sons, Leith Walk Nurseries, Edinburgh.
1865. Michie, Christopher Young, Forester, Cullen House, Banffshire.
1893. Michie, William, Forester, Gulworthy, Tavistock, Devonshire.
1893. Middlemass, Archibald, Forester, Tulliallan, Kincardine-on-Forth.

Date of Election.

1894. Mill, George, S.S.C., 21 St Andrew Square, Edinburgh.
1893. Millar, K. W., Assistant Forester, Lynedoch, Perth.
1889. Miller, William, Agent, Coombe Abbey, Coventry, Warwickshire.
1882. Milne, Alexander, of James Dickson & Sons, 32 Hanover Street, Edinburgh.
1891. Milne, R. W., Forester, 9 Etterby Street, Stanwix, Carlisle.
1893. Milne, R. W., 57 Barrasgate Road, Fraserburgh.
1890. Milne, William, Farmer, Foulden, Berwick-on-Tweed.
1894. Milsom, Isaac, Gardener and Steward, Claydon Park, Winslow, Bucks.
1893. Mitchell, Archibald, Forester, Dunraven Castle, Bridgend, Glamorganshire.
1869. Mitchell, James, Overseer, Aldie Castle, Fossoway.
1894. Moffat, Edward, Forester, Madeley Estate, Staffordshire.
1876. Morgan, George, Wood Merchant, Turret Bank, Crieff, Perthshire.
1894. Morton, David, Assistant Forester, Donibristle, Fife.
1894. Morton, David, Overseer, Cally, Gatehouse, Kirkcudbrightshire.
1894. Moss, Edward, Assistant Forester, Handsworth Nurseries, Sheffield.
1893. Mudie, Theodore E., Factor, Montrave, Largo, Fife.
1890. Muirhead, George, Factor, Haddo House, Aberdeen.
1866. Muirhead, John, Forester, Bicton, Budleigh Salterton, Devonshire.
1894. Munro, Alexander, Forester, West Park, Damerham, Salisbury, Wilts.
1890. Munro, Donald, Forester, Coul, Ross-shire.
1876. Munro, Hugh, Forester, Holkham Hall, Norfolk.
1892. Murdoch, John, Ironmonger, Dalkeith, Midlothian.
1892. Murray, Alexander, Forester, Murthly, Perth.
1892. Murray, John, Forester, Airthrey Castle, Bridge of Allan.

1894. Neil, Archibald, Forester, Warkton, Kettering, Northamptonshire.
1893. Nelson, Robert, Assistant Forester, Kinmount Estate, Cummertrees, Dumfriesshire.
1885. Newbigging, John W., Nurseryman, Dumfries.
1893. Nicol, James, Aird's Mill, Muirkirk, Ayrshire.
1891. Nicoll, John, 48 Castle Street, Edinburgh.

1894. Orkney, Wm. C., Overseer, Moncreiffe, Bridge of Earn, Perth.

1875. Page, Andrew Duncan, Land Steward, Culzean, Maybole, Ayrshire.
1893. Page, Walter, Farmer, Myregornie, Kirkcaldy, Fife.
1857. Palmer & Son, John, Nurserymen, Annan, Dumfriesshire.
1893. Parker, John, Farmer, Nesbit Hill, Duns, Berwickshire.
1894. Paton, George, Assistant Gardener, Mortonhall, Liberton, Midlothian.
1879. Paton, Hugh, Nurseryman, Kilmarnock, Ayrshire.
1889. Patterson, Colin M., Resident Factor, Newbattle Estate, Dalkeith.
1894. Patterson, George, Forester's Office, Leinster Street, Athy, Co. Kildare, Ireland.
1887. Paxton, Thomas A., Forester, Newbattle, Dalkeith.
1869. Peebles, Andrew, Estate Office, Albury, Guildford, Surrey.
1871. Pendreigh, John, Assistant Forester, Port Bannatyne, Rothesay, Bute.
1892. Pirrie, George, Wood Merchant, Dalkeith, Midlothian.
1878. Pitcaithley, Alexander, Forester, Sudbourne Hall, Wickham Market, Suffolk.

Date of Election

1892. Potts, G. H., Fettes Mount, Lasswade, Midlothian.
1874. Platt, Colonel Henry, Gorddinog, Llanfairfechan, Carnarvonshire.
1893. Porter, John, Farmer, Nesbit Hill, Duns, Berwickshire.
1892. Proudfoot, William, Forester, Raith, Kirkcaldy, Fife.

1888. Ralston, James, Forester, Castlecary, Glasgow.
1892. Ramsay, Walter, Assistant Forester, Pollock, Pollokshaws, Glasgow.
1870. Rattray, Thos., Forester, Westonbirt House, Tetbury, Gloucestershire.
1894. Reid, James S., Forester, Balbirnie, Markinch, Fife.
1893. Reid, Rev. John, The Manse, Foulden, Berwickshire.
1873. Richardson, Adam, Royal Botanic Garden, Edinburgh.
1877. Rider, William H., 14 Bartholomew Close, London, E.C.
1892. Ritchie, Alexander, Assistant Forester, Lynedoch, Perth.
1884. Robertson, A. B., Moncreiffe House, Bridge of Earn, Perth.
1894. Robertson, George D., Assistant Forester, Carolside, Earlstown.
1890. Robertson, J. S., Cawdor Estate Office, Nairn.
1883. Robertson, William, Assistant Forester, Ringwood, Birnam, Perth.
1887. *Robertson, William, Assistant Forester, Scone, Perth.*
1890. *Robertson, William, Assistant Forester, Bawdsey Manor, Woodbridge, Suffolk.*
1888. *Robson, John, Assistant Forester, Ardgowan Castle, Inverkip, Renfrewshire.*
1893. Rodger, James, Assistant Forester, Scone, Perth.
1893. Romanes, James, C.A., Meadowbank, Dalkeith.
1887. Ross, John, Forester, Hopetoun, South Queensferry, Linlithgowshire.
1867. Russell, John, Manager, Craigie House, Ayr.
1893. Rutherford, James A., Land Agent, Highclere Park, Newbury, Berks.
1870. Rutherford, John, Forester, Linthaugh, Jedburgh, Roxburghshire.

1894. Samson, David T., Seafield Estates Office, Grantown, Strathspey.
1858. Sandbach, Henry R., Hafodunos, Abergele, Denbighshire.
1875. Sang, Edmund, of E. Sang & Sons, Nurserymen, Kirkcaldy.
1871. Scarth, T. W., Land Agent, Raby Castle, Staindrop, Darlington.
1870. Scott, Adam, Forester, Southwick Park, Fareham, Hants.
1892. Scott, David, Overseer, Dumfries House, Cumnock, Ayrshire.
1883. Scott, D. P., Hilltown Branch, National Bank of Scotland, Dundee.
1881. Scott, James, Forester, Woollaton Hall, Notts.
1894. Scott, J. H., 31 Montgomery Street, Edinburgh.
1890. Scott, John, Assistant Forester, Highclere Estate, Newbury, Berks.
1892. Scott, John, Forester and Bailiff, Gilling Estate, Gilling, York.
1894. Scott, John, Forester, Gordon Castle, Fochabers, Morayshire.
1890. Scrimgeour, John, Overseer, St Martin's, Perth.
1870. Shanks, John, Forester, Kildrummy Castle, Mossat, Aberdeenshire.
1893. Shaw, Andrew, Victoria Saw-Mills, Perth.
1891. Shaw, James, Mayfield Cottage, Southside Place, Inverness.
1893. Shaw, William, School House, Ballingry, Lochgelly, Fife.
1887. Simpson, Anthony, Forester, New Cottage, East End, Golspie, Sutherland.
1893. Simpson, Hugh, Assistant Forester, Lynedoch, Perth.
1894. Simpson, James, of D. & W. Croll, Nurserymen, Dundee.

Date of Election.

1869. Sinton, James, Forester, Stourhead Estate, Stourton, Bath.
1868. Slater, Andrew, Overseer, Haystoun, Peebles.
1892. Smith, Charles, Royal George Hotel, Dunoon, Argyle.
1873. Smith, G. B., Wire Fence Manufacturer, 61 West Regent St., Glasgow.
1894. Smith, Henry, Forester, Duncombe Park, Helmsley, Yorks.
1871. Smith, James, The Gardens, Mentmore, Leighton-Buzzard, Bucks.
1883. Smith, James, The Gardens, Hopetoun, South Queensferry.
1886. Smith, John, Surveyor, Romsey, Hampshire.
1870. Smith, Thomas, Nurseryman, Stranraer, Wigtownshire.
1883. Smith, William, Chemist, Stockbridge, Edinburgh.
1885. Spiers, David, Overseer, Mugdrum, Newburgh, Fife.
1875. Stewart, J. M., Hale Park, Salisbury, Hants.
1893. Stewart, Richard, Loxwell Farm, Derryhill, Calne, Wilts.
1876. Stewart, Robert, Forester, Stonefield, Tarbert, Lochfyne, N.B.
1889. Storie, Robert, 92 High Street, Dalkeith.
1893. Storie, William, Lilleshall, Newport, Salop.
1893. Storie, W., Whitway House, Newbury, Berks.
1876. Stuart, Charles, Forester, Glenmoriston, Inverness.
1892. Sutherland, John D., Estate Agent, Oban, Argyle.
1872. Swan, R. G., Auctioneer, Duns, Berwickshire.

1869. Tait, David, Overseer, Owston Park, Doncaster, Yorkshire.
1892. Tait, James, Builder, Penicuik, Midlothian.
1892. Taylor, Alexander, Assistant Forester, Lynedoch, Perth.
1894. Taylor, James, Forester, Gilston, Colinsburgh, Fife.
1889. Taylor, William F., 23 Duke Street, Bishopsgate, London, E.C.
1894. Temple, M., The Gardens, Carron House, Falkirk, Stirlingshire.
1891. Tennant, Edward, 195 West George Street, Glasgow.
1893. Thomson, David, Agricultural Engineer, Woodhead Street, Dunfermline.
1893. Thomson, David W., Nurseryman, 24 Frederick Street, Edinburgh.
1894. Thomson, John, Forester, Brancepeth Castle, Durham.
1869. Thomson, Lockhart, S.S.C., 114 George Street, Edinburgh.
1871. Tomlinson, Wilson, Forester, Clumber Park, Worksop, Notts.

1883. Underwood, Henry E., Sub-Agent, Fornham, St Genevieve, Bury St Edmunds, Suffolk.
1894. Urquhart, F., Nurseryman, Inverness.

1893. Waddell, Jas., Merchant, Leven, Fife.
1893. Waite, W. D., Nurseryman, Hope Nurseries, Berwick-on-Tweed.
1894. Walker, Henry H., Factor, Monreith, Port William, Wigtownshire.
1870. Wall, G. Y., Land Agent, Grange House, Darlington, Durham.
1893. Wallace, David P., Forester, The Saw-Mills, Filleigh, Molton, S. Devon.
1893. Wallace, Robert, Timber Merchant, 31 Leith Walk, Edinburgh.
1894. Ward, James, Forester, Keith, Banffshire.
1894. Watson, A. R., Timber Merchant, Elgin.
1879. Watson, John, of Earnock, Hamilton, Lanarkshire.
1893. Watson, John, Timber Merchant, Annandale Street, Edinburgh.
1893. Watson, John T., Factor, 6 Bruntsfield Gardens, Edinburgh.
1872. Watt, James, J.P., of Little & Ballantyne, Nurserymen, Carlisle.

Date of Election.

1893. Watt, James W., Knowefield Nurseries, Carlisle.
1889. Watters, Dennis, Forester, Wester Elchies, Carron, Strathspey.
1894. Watters, Frank, Forester, 11 Main Street, Alexandria, Dumbartonshire.
1887. Waugh, Thomas, Hutt Valley Nursery, Blackbridge, Wellington, New Zealand.
1874. Webster, Angus D., Manager of Woods, Woburn, Bedfordshire.
1894. Webster, Charles, The Gardens, Gordon Castle, Fochabers.
1891. Welsh, James, of Dicksons & Co., 1 Waterloo Place, Edinburgh.
1866. Welsh, William M., of Dicksons & Co., 1 Waterloo Place, Edinburgh.
1894. Whitehead, Amos, Assistant Gardener, Mortonhall, Liberton, Midlothian.
1891. Whittingham, W., Estate Office, Norton Priory, Runcorn, Cheshire.
1884. Whitton, James, Superintendent of Parks, 249 George Street, Glasgow.
1883. Whitton, Peter, The Gardens, Methven Castle, Perth.
1883. Wilkie, Charles, Assistant Forester, Lennoxlove, Haddington.
1891. Wilkie, G., Architect, Hayfield, Peebles.
1882. Williamson, A., Wood Manager, Eridge Castle, Tunbridge Wells, Kent.
1894. Williamson, Alex., M.A., LL.B., 2 Osborne Terrace, Edinburgh.
1889. Williamson, A. T., 7 Kew Terrace, Edinburgh.
1890. Williamson, George, The Links, Leven, Fife.
1887. Wilson, George, Forester, Penrice Castle, Swansea, Wales.
1893. Windredge, C. E., Professor of Music, Leven, Fife.
1883. Winning, John G., Estate Office, Branxholm, Hawick.
1892. Winton, Thomas, Timber Merchant, Dundee.
1893. Wiseman, Edward, Nurseryman, Elgin.
1894. Wood, William, The Gardens, Newton Don, Kelso, Berwickshire.
1868. Wyllie, George, Ballogie, Aboyne, Aberdeenshire.

1892. Young, H. U., Milford Nurseries, Milford, Surrey.
1875. Young, William, Forester, Morriston Cottage, Earlston, Berwickshire.

Royal Scottish Arboricultural Society.

Instituted 16th February 1854.

PATRON.

HER MOST GRACIOUS MAJESTY THE QUEEN.

The Forty-first Annual General Meeting of the Royal Scottish Arboricultural Society was held in Dowell's Rooms, 20 George Street, Edinburgh, on Monday, the 6th day of August 1894. Mr John Methven, Senior Vice-President of the Society, presided.

Minutes Read.

The Secretary read the Minutes of the various Meetings of Council held during the past year, and they were approved of.

Election of New Members.

The following sixty-five Candidates for Membership were duly elected:—

Baxter, William, Estate Office, Mertoun, St Boswells.
Beech, George, Assistant Gardener, Mortonhall, Liberton.
Buchan, R., Overseer, Guy's Cliff, Warwick.
Cabry, Tom, Nisbet Hill, Duns, Berwickshire.
Campbell, John, Timber Merchant, Inverness.
Cook, James, jun., Estate Office, Craigielaw, Longniddry.
Cowie, John, Forester, Meikleour, Perth.
Cunningham, W. M., Nurseryman, Elgin.
Darling, David C., Nurseryman, Aberdeen.
Duthie, W. G., Forester, Bargany, Girvan, Ayrshire.
Emslie, William, Kintore Nurseries, Kintore, Aberdeenshire.
Farquharson, James, Forester, Ardgowan, Inverkip, Renfrewshire.
Fernie, Robert, Assistant Forester, Donibristle, Fife.

Gillespie, James, Assistant Forester, Mortonhall, Liberton.
Gilmour, Captain R. Gordon, of Craigmillar, The Inch, Midlothian.
Grimes, Ernest, Assistant Forester, Welbeck, Worksop, Notts.
Harvey, James, Gardener, Mortonhall, Liberton, Midlothian.
Henry, Robert, Assistant Forester, Ardgowan, Inverkip, Renfrewshire.
Kidd, William, Forester, Harewood, Leeds.
King, William G., King's Mills, Elgin.
Lamington, The Right Honourable Lord, Lamington, Lanarkshire.
Logan, Charles B., Commissioner to the Countess Dowager of Seafield, Coulnakyle, Grantown, Strathspey.
Lumsden, Frederick R., Newburn, Largo, Fife.
Malloch, William, Timber Merchant, 50 South Street, Perth.
Maughan, John, Estate Agent, Jervaulx Abbey, Bedale, Yorks.
Mill, George, S.S.C., 21 St Andrew Square, Edinburgh.
Milsom, Isaac, Gardener and Steward, Claydon Park, Winslow, Bucks.
Moffat, Edward, Forester, Madeley Estate, Staffordshire.
Morton, David, Overseer, Cally, Gatehouse, Kirkcudbrightshire.
Morton, David, Assistant Forester, Donibristle, Fife.
Moss, Edward, Assistant Forester, Handsworth Nurseries, Sheffield.
Munro, Alexander, Forester, West Park, Damerham, Salisbury.
M'Callum, Edward, Forester, Falkland, Fife.
M'Clownie, John, The Residency, Zomba, British Central Africa.
M'Culloch, Christopher, Assistant Forester, Ardgowan, Inverkip.
M'Donald, James, Forester, Kinnaird Castle, Brechin.
M'Dougall, Alexander, Assistant Forester, Boughton, Kettering.
M'Ilwraith, William, Assistant Forester, Ardgowan, Inverkip.
M'Kenzie, Alexander, Assistant Forester, Altyre, Forres.
M'Kenzie, John R., Assistant Forester, Altyre, Forres.
M'Pherson, Alexander, Assistant Forester, Altyre, Forres.
Neil, Archibald, Forester, Warkton, Kettering, Northamptonshire.
Orkney, William C., Overseer, Moncreiffe, Bridge of Earn, Perth.
Paton, George, Assistant Gardener, Mortonhall, Liberton, Midlothian.
Patterson, George, Forester's Office, Leinster Street, Athy, County Kildare.
Reid, James, Forester, Balbirnie, Markinch, Fife.
Robertson, George D., Assistant Forester, Carolside, Earlston, Berwickshire.
Samson, David T., Seafield Estates Office, Grantown, Strathspey.
Sanderson, William, Talbot House, Ferry Road, Leith.
Scott, John, Forester, Gordon Castle, Fochabers.
Scott, J. H., 31 Montgomery Street, Edinburgh.
Simpson, James, of D. & W. Croll, Nurserymen, Dundee.
Smith, Henry, Forester, Duncombe Park, Helmsley, Yorks.
Taylor, James, Forester, Gilston, Colinsburgh, Fife.
Temple, M., The Gardens, Carron House, Falkirk, Stirlingshire.
Thomson, John, Forester, Brancepeth Castle, Durham.
Urquhart, F., Nurseryman, Inverness.
Walker, Henry H., Factor, Monreith, Port William, Wigtownshire.
Ward, James, Forester, Keith, Banffshire.

60 Watson, A. R., Timber Merchant, Elgin.
Watters, Frank, Forester, 111 Main Street, Alexandria, Dumbartonshire.
Webster, Charles, The Gardens, Gordon Castle, Fochabers.
Whitehead, Amos, Assistant Gardener, Mortonhall, Liberton.
Williamson, Alexander, M.A., LL.B., 2 Osborne Terrace, Edinburgh.
65 Wood, William, The Gardens, Newton Don, Berwickshire.

Election of Office-Bearers.

The following Office-Bearers were unanimously appointed for the year 1894-95.

PRESIDENT.

R. C. Munro Ferguson, M. P., of Raith and Novar, Raith House, Kirkcaldy, Fife.

VICE-PRESIDENTS.

John Methven, Nurseryman, 15 Princes Street, Edinburgh.
Hugh Cleghorn, M.D., LL.D., F.R.S.E., of Stravithie, St Andrews.
D. F. Mackenzie, Factor, Mortonhall, Liberton.
Isaac Bayley Balfour, Sc.D., M.D., F.L.S., Professor of Botany, Edinburgh
James Moffat, Assistant Factor, 48 Castle Street, Edinburgh.

COUNCIL.

Lewis Bayne, Forester, Scone, Perthshire.
Malcolm Dunn, The Palace Gardens, Dalkeith.
D. P. Laird, Nurseryman, Pinkhill, Murrayfield, Midlothian.
Andrew Slater, Overseer, Haystoun, Peebles.
Colonel F. Bailey, R.E., Lecturer on Forestry, Edinburgh University.
Robert Baxter, Forester, Dalkeith Park, Dalkeith.
Alexander Milne, Nurseryman and Seedsman, 32 Hanover Street, Edinburgh.
James Robertson, Wood Manager, Panmure, Carnoustie.
William Somerville, D.Œc., B.Sc., F.R.S.E., Professor of Agriculture and Forestry, Durham College of Science, Newcastle-on-Tyne.
Charles Buchanan, Overseer, Penicuik House, Penicuik.
John Clark, Forester, Haddo House, Aberdeen.
James Cook, Land Steward, Arniston, Gorebridge.
David Keir, Forester, Ladywell, Dunkeld.
George Mackinnon, The Gardens, Melville Castle, Lasswade.
W. M. Welsh, Nurseryman and Seedsman, 1 Waterloo Place, Edinburgh.

SECRETARY AND TREASURER.

William J. Moffat (*Resigned since Election*).
Interim Secretary, Robert Galloway, 5 St Andrew Square, Edinburgh.
Interim Treasurer, George Mill, S.S.C., 5 St Andrew Square, Edinburgh.

AUDITOR.

John Ord Mackenzie, W.S., of Dolphinton, 9 Hill Street, Edinburgh.

JUDGES.

Alexander Milne, 32 Hanover Street, Edinburgh (*Convener*).
Lewis Bayne, Jeannie Bank, Scone, Perth.
A. T. Williamson, 2 Osborne Terrace, Edinburgh.
D. P. Laird, Pinkhill, Murrayfield, Midlothian.
John Michie, Danzig, Balmoral.

COMMITTEE ON TRANSACTIONS.

Dr Cleghorn of Stravithie, St Andrews (*Convener*).
Professor I. Bayley Balfour, Edinburgh.
Malcolm Dunn, The Palace Gardens, Dalkeith.
Robert Lindsay, Curator, Royal Botanic Garden, Edinburgh.
John Methven, 15 Princes Street, Edinburgh.
Andrew Slater, Haystoun, Peebles.
William Somerville, Professor of Agriculture and Forestry, Durham College of Science, Newcastle-on-Tyne.

PHOTOGRAPHIC ARTIST.

Philip Cockburn, Dalkeith.

LOCAL SECRETARIES.

Scotland.

Daniel Dewar, Forester, Beaufort Castle, Beauly.
William Doughty, Forester, Langholm Estate, Canonbie.
James Kay, Forester, Bute Estate, Rothesay.
William M'Lean, Forester, Eglinton Castle, Irvine.
C. Y. Michie, Forester, Cullen House, Banffshire.
John Michie, Forester, Balmoral, Ballater.
James Robertson, Forester, Panmure House, Carnoustie.
D. Scott, Forester, Darnaway Castle, Forres.

England.

James Barton, Forester, Hatfield, Herts.
James Barrie, Forester, Stevenstone Estate, Torrington, Devon.
Andrew Boa, junior, Sub-Agent, Great Thurlow, Suffolk.
Robert T. Collins, Forester, Trentham, Stoke-on-Trent, Staffordshire.
John Davidson, *Secretary*, English Arboricultural Society, Haydon-Bridge-on-Tyne.
Frank Hull, Forester, Lillieshall, Newport, Salop.
James Rutherford, Agent, Kirkleatham, Redcar, Yorkshire.
D. Tait, Estate Bailiff, Owston Park, Doncaster, Yorks.

Ireland.

Robert Coupar, Forester, Ashford, Cong, County Galway.

The Accident to Lieut.-Colonel Bailey at Newtonmore.

Dr Cleghorn of Stravithie, having drawn the attention of the Meeting to the severe nature of the accident which Lieut.-Colonel Bailey, R.E., Lecturer on Forestry, Edinburgh University, had met with a few days previously, in the collision on the Highland Railway at Newtonmore, it was unanimously resolved to send him a telegram, expressing the deepest sympathy in his grievous injuries.

The following telegram, signed by the Chairman on behalf of the Meeting, was thereupon dispatched to Colonel Bailey:—

Telegram to Lieut.-Col. Bailey, *The Hotel, Newtonmore, Kingussie.*

"The Members of the Royal Scottish Arboricultural Society, in General Meeting assembled, desire to express their deepest sympathy in your severe accident, and sincerely hope that you may have a speedy and thorough recovery.

"John Methven, *Chairman.*"

Edinburgh, *6th August* 1894.

Chairman's Address.

Mr John Methven, Senior Vice-President, in the absence of the President, Mr Munro Ferguson, then delivered an Address,[1] for which, on the motion of Mr Dunn, Dalkeith, he was heartily thanked.

The Treasurer's Report.

The Treasurer reported having received during year 1893 the following amounts:—

Arrears of Subscription, ...	£30	2	6
Current Year's Subscription, . . .	101	3	0
Subscriptions paid in advance, . . .	4	0	6
Do. Life Members, . . .	9	2	0
Donations to Illustrations Fund, . .	8	16	0
Advertisements and Sale of *Transactions*,	12	1	8
Sum over from Incidental Expenses at Excursion to Windsor, etc., . .	0	6	2
Total Receipts,	£165	11	10

[1] A verbatim report of the Address appears in the *Transactions*.

The Expenditure was as follows:—

Stationery, Printing, etc.,	£68	4	6
Jeweller's Account for Medals, etc., for years 1892 and 1893,	26	18	0
Prizes paid in Money,	7	10	0
Advertising,	2	19	6
Honorarium and Expenses to Author of Excursion Report,	8	8	0
Office Rent,	1	19	6
Secretary and Treasurer's Salary, with Income Tax thereon,	30	17	6
Martin & Company, Windsor,	6	12	0
Postages and Petty Expenses,	9	14	0
Sundries,	5	8	6
Total Payments,	£168	11	6
Showing a deficit of	£2	19	8

Subscriptions in arrear amounted to £137, 19s. 10d., and the Nett Funds of the Society were £85, 11s. 8d.

Mr W. H. Massie, Edinburgh, subjected the Statement to severe criticism, and asked for information particularly as to the reduction in recent years of the Funds of the Society. The Chairman promised Mr Massie that any questions he might desire to ask would be answered, and full information given, upon application to the proper source. Thereafter, on the motion of Mr M. Dunn, seconded by Mr D. P. Laird, the Report was adopted.

The Prize Essays and Awards.

Mr Alexander Milne, Convener of the Judges, then read the Report on the Essays, and the following Awards were made in accordance therewith,—the sealed envelope accompanying each Essay being opened by the Secretary, and the author's name announced to the Meeting.

Judges' Report.

Report on the Essays, and other Papers, sent in Competition to the Royal Scottish Arboricultural Society in 1894.

The Essays sent in this year for adjudication number seventeen. They are, as a rule, of an average standard of excellence. The

Judges have carefully gone over and examined the merits of the various Papers, and have now the honour to report thereon as follows :—

Class I.

I. On Transporting Timber. (Motto, "Science with Practice.") By George Cadell (late H.M. Indian Forest Department), Langley House, Surbiton, Surrey.

A descriptive paper on transporting timber in India and foreign parts. Although not applicable to the conditions prevailing in this country, it throws a useful light on some modes of transport. An Award of a No. 2 Silver Medal is recommended.

II. On the Financial Results of the Cultivation of Woods. (Motto, "Vigilantia.")

It is recommended that this paper be revised, and the calculations checked, by the author.

III. On the Forestry Exhibition, Earl's Court, London, 1893. (Motto, "Trees are God's Architecture.") By George Cadell (late H.M. Indian Forest Department), Langley House, Surbiton, Surrey.

An interesting account of that Exhibition. Recommended an Award of a Bronze Medal.

IV. On Larch Canker, or *Peziza Willkommii*. (Motto, "'Tis never too late to mend.") By Robert W. Milne, Etterby Street, Stanwix, Carlisle.

This is an essay of some merit, and enters fully into the disease. An Award of the No. 2 Silver Medal is recommended.

V. On the Best Method of Procedure in growing a Continuous Crop of Timber in Woods or Plantations. (Motto, "Lignum.") By A. C. Forbes, Forester, Bowood, Calne, Wilts.

The author of this essay gives a rather lengthy and elaborate account of his proposals, and has taken considerable pains to put his ideas clearly before the reader. Recommended an Award of a No. 2 Silver Medal.

VI. On the *Chermes Laricis*. (Motto, "Observanda.") By Francis Berry, Forester, Colquoich, Inverkindie, Aberdeenshire.

A useful paper on this subject. Award recommended, No. 2 Silver Medal.

VII. On the Thinning of Woods. (Motto, "Arthur Roy.") By Archibald Mitchell, Forester, Dunraven Castle, Glamorganshire, South Wales.

This is a good paper, in which the writer compares the close with the wide method of thinning. Award recommended, No. 2 Silver Medal.

VIII. On Pruning Avenue, Park, and Forest Trees, and Renovating Old Trees. (Motto, "Shellac.") By Archibald Mitchell, Forester, Dunraven Castle, Glamorganshire, South Wales.

All the leading practical points of interest are touched upon and fairly well treated. Recommended an Award of a No. 2 Silver Medal.

IX. On Coppice Woods. (Motto, "Probatum est.") By John Smith, Surveyor, Romsey, Hants.

The writer describes the different kinds of coppice woods, and the modes of planting them, with their uses. Award recommended, No. 2 Silver Medal.

X. On the Valuation of Timber. (Motto, "Shylock.")

No award.

XI. On Pruning Avenue, Park, and Forest Trees, and Renovating Old Trees. (Motto, "Arden.")

No Award.

XII. On a Method for obtaining the Diameter of Trees at a given Height. (Motto, "Camera.")

No Award.

XIII. On the Best Method of Rearing Plantations with the view of obtaining Timber of a Clean Growth, Fine Quality, and High Commercial Value. (Motto, "Home Timber.")

The writer deserves credit for his paper, but the calculations are not sound. It is therefore recommended that the paper be returned to the author in order that he may make the necessary corrections, and submit it again next year.

XIV. On the Preserving of Timber for Estate Purposes. (Motto, "Wood Merchant.") By D. F. Mackenzie, Factor, Mortonhall, Liberton, Midlothian.

A practical paper on the Creosoting of Wood, giving a plan and the cost of Creosoting Works, along with full details of the operation, and instructions for working the apparatus. This excellent practical paper is recommended an Award of the Society's No. 1 Silver Medal.

Class II.

I. On the Management of Oak Coppice. (Motto, "Hope.") By Alexander Campbell, Assistant Forester, Scone, Perth.

A practical paper, with the useful points plainly stated. Award recommended, Bronze Medal.

II. On the Best Methods of Forming and Maintaining Fences. (Motto, "Safe bind, safe find.") By James Rodger, Assistant Forester, Scone, Perth.

The writer gives a clear account of the best methods of forming and maintaining fences, along with the approximate costs. Award recommended, No. 2 Silver Medal.

III. On the Pruning of Forest Trees. (Motto, "Prune when small, or not at all.") By William Forgan, Assistant Forester, Lynedoch Road, New Scone, Perth.

A sound practical paper. Award recommended, Bronze Medal.

Presentations to the Society's Library.

1. Annual Progress Report upon State Forest Administration in South Australia for the year 1892-1893.
2. Six Pamphlets bearing on Forestry, written by Dr John Nisbet of the Indian Forest Service, and presented by him.
3. *Transactions of the Massachusetts Horticultural Society* for 1893, part i.
4. *Proceedings and Transactions of the Nova Scotian Institute of Science*, series 2, vol. i., part 2.
5. *Transactions of the Botanical Society of Edinburgh*, 1893.
6. Various Reports from the Department of Agriculture, Victoria, Australia.
7. Various Reports from the Department of Agriculture, Britain.
8. Annual Administration Report of the Forest Department, Madras Presidency, for period ending 30th June 1893.

The Chair of Forestry.

The Chairman reported that he, along with Mr James Moffat, had been appointed by the Council as a Committee, to hand over to the Edinburgh University authorities the money collected by the Society in aid of the Endowment Fund of the Chair of Forestry.

This they had done on the 2nd of May, on the distinct understanding that the money should be used for no other purpose than the establishment of a Chair of Forestry. The sum paid over amounted to £433, 10s.

In acknowledging the receipt of the amount, the Rev. Dr Taylor, Secretary to the University Court, wrote as follows :—

University of Edinburgh,
3rd May 1894.

My dear Sir,—I beg to acknowledge receipt of your letter of yesterday's date, enclosing bank draft for £433, 10s., on account of the subscriptions collected by the Royal Scottish Arboricultural Society towards the Endowment of a Chair of Forestry in this University.

As the University Court meets on 14th curt., I hope to be able to apprise you immediately thereafter that the Court have accepted

the money thus handed over to them for the purpose for which it has been exclusively provided. Yours very truly,

M. C. Taylor, *Secy.*

John Methven, Esq.,
(of Messrs Thomas Methven & Sons),
15 Princes Street, Edinburgh.

A further letter was received on the 19th May, as follows :—

University of Edinburgh,
18*th May* 1894.

Dear Sir,—Referring to my letter of 3rd inst., I now beg to inform you that the University Court, at their meeting on Monday last, accepted the money, £433, 10s., forwarded by you on behalf of the Royal Scottish Arboricultural Society towards the Fund for the Endowment of a Chair of Forestry in this University. The Court have noted the purpose for which this money is alone applicable. To obviate any misapprehension in future, however, I am directed to ask whether the Endowment of a Lectureship would not, in the opinion of your Society, be regarded as fulfilling this purpose, should the Endowment of a Chair of Forestry prove to be impracticable. The Court are quite in favour of the institution of a Chair of Forestry, but failing the necessary funds, it might happen that a Lectureship only could be secured. Please let me know at your convenience whether this would meet with the approval of your Society. I am, dear Sir, yours truly, M. C. Taylor, *Secy.*

J. Methven, Esq.,
(of Messrs T. Methven & Sons),
15 Princes Street.

After the reading of this letter, the Chairman asked the Meeting whether it approved of the alternative suggested, and received a unanimous affirmative. The Secretary was instructed to inscribe the letters in the Minutes. Dr Cleghorn and Mr Dunn having made a few remarks as to the Scheme, and what had been done in regard to it in the past year, the subject then dropped.

The Excursion of 1895.

Considerable interest was manifested as to the arrangements to be made for the Excursion of 1895.

Mr Munro Ferguson some time back suggested that the Society should visit Germany at the earliest opportunity, and promised his

help in every way he could to further the success of the Excursion, should the Society see their way to the undertaking.

A motion by Mr Dunn, Convener of the Excursion Committee, that the Society should visit Germany in 1895, was unanimously adopted.

Professor Somerville and Mr James Watt, Carlisle, who had both recently returned from Germany, then gave their views as to the length of time required and the probable cost, and touched upon several other points of interest to those who may join in the Excursion to the German Forests.

Mr Dunn thanked those gentlemen for the useful information they had laid before the Meeting, and moved that a remit be made to the Excursion Committee to make the necessary inquiries and arrangements, and to report to the Council. This was agreed to.

Motions which had been Notified.

The following Motions were duly notified in accordance with Fundamental Law XV., and fell to be discussed and decided upon :—

By Mr Dunn, Dalkeith,—

(1) *The Annual General Meeting of the Society to be held in the month of January*,—for the election of Office-Bearers and New Members; the hearing of the Secretary, Treasurer, and Auditor's Reports; and all other appropriate business.

(2) *A General Meeting to be held at the date of the Excursion, the time and place to be fixed by the Council*,—at which the President or Chairman will deliver an address, new Members be elected, and Forestry Subjects, approved by the Council, discussed.

By Mr Slater, Haystoun, Peebles,—

(1) That a new rule be enacted in the following terms :—"No Member shall be entitled to withdraw from the Society until he has paid all subscriptions due by him, and intimated his intention to withdraw in writing: and further, no ordinary Member shall be entitled to withdraw from the Society within the five years next ensuing after his having become a Member,

unless he may elect to pay a sum which, when added to the subscriptions already paid by him, shall amount to the total of five annual subscriptions."

(2) That Bye-Laws IX. and X. be rescinded, and that the following be substituted, viz. :—"Successful Competitors will be awarded 1st, 2nd, and 3rd Class Certificates by the Society, and Money or other Prizes that may be offered by private individuals for Special Subjects."

Mr Dunn put the motions standing in his name to the Meeting, and they were seconded by Mr D. F. Mackenzie.

Mr Slater then moved as an amendment,—

That this Meeting be adjourned to the 14th day of November next, at 1.30 o'clock; and that a Committee, composed of three Members of the Council, and three of the outside Members of the Society, be appointed to consider and report, to said Meeting, on the following, viz., (1) What alterations or additions, if any, are necessary in the Laws and Bye-Laws? (2) What means should be adopted with the view of making the Society more popular and useful? and (3) Generally to consider and report on the whole affairs of the Society. The Committee to act in a semi-judicial capacity, with powers to examine witnesses, and inspect documents.

Mr W. H. Massie, 1 Waterloo Place, Edinburgh, seconded the amendment.

After considerable discussion, the amendment was ruled out of order. Mr Slater then moved the previous question, which was seconded by Mr Massie. Some discussion followed, and on a vote being taken, 2 voted for the previous question, and 22 supported the original motion, a number declining to vote. Mr Slater then pointed out that the motion fell to the ground, in respect that, in accordance with Law XVI., the requisite number of Members did not vote. After further discussion, some Members said that they did not object to the appointment of a Committee, but that it would be necessary to call an Extraordinary Meeting, in accordance with Law XV., to discuss and settle the question. On that

understanding, Mr SLATER withdrew his objection, and Mr DUNN's motions were agreed to.

Mr SLATER then withdrew the two motions notified by him.

On the motion of Dr SOMERVILLE, a cordial vote of thanks was given to the Chairman, and the Meeting terminated.

SYLLABUS.

The following subjects are offered for competition in 1895 :—

[*The Judges are empowered to fix the value of the Prizes to be awarded according to the respective merits of the Essays.*

All Essays and Reports intended for Competition must be lodged with the Secretary not later than 10th April 1895. All Collections of Cones, Seeds, and Rustic Work must be in the hands of the Secretary not less than three days before the Annual General Meeting, to be held on the 23rd January 1895. Each Essay, Report, Collection, or Article must bear a MOTTO, *and be accompanied by a sealed envelope bearing outside the* SAME MOTTO, *and the Class to which the Competitor belongs, and containing inside, a* CARD *with the* NAME *and* ADDRESS *of the Competitor.*

Judges cannot compete during their term of office.

Successful Competitors may either have the medals or their converted values, which are as follows:—Gold, £5; No. 1 *Silver Medal*, £3; No. 2 *Silver*, £2; *Bronze*, 10s.]

CLASS I.—FOR OPEN COMPETITION.

I. For an approved Report detailing the methods employed to bring about the Natural Regeneration of a Wood, and the subsequent Treatment as regards Artificial Assistance, should such have been rendered necessary owing to the Natural Sowing having been irregular, insufficient, or too dense. (*A Medal.*)

> The author must cite some particular case, and give the results of a systematic attempt at natural regeneration, bearing in mind the fact that a patchy imperfect restocking cannot be regarded as satisfactory or successful.

II. For an approved Essay on the best methods of Pruning Avenue and Park and Forest Trees, keeping in view the production of timber and the landscape effect; also on the best methods for renovating old Park Trees. (*Silver Medal* offered by Wm. M.

Welsh, Esq., of Messrs Dicksons & Co., 1 Waterloo Place, Edinburgh.)

III. For an approved Report on the Newer Coniferæ growing in any County in Scotland. (*A Medal.*)

The Report to give the age, height, and girth of stem at 5 feet up, of the best tree of each species; the diameter of spread of branches of ornamental specimens; the altitude, aspect, and exposure, and the nature of the soil and subsoil where they grow. Details should be given of any special merit or feature displayed in their habit and rate of growth, and of their qualities and uses for economic or ornamental purposes.

IV. For an approved Essay on the Valuation of Woods or Plantations for the purpose of Transfer. (*A Medal.*)

The writer to describe the method (*a*) of valuing matured woods, (*b*) middle-aged woods, (*c*) park trees and others that may be, in addition to their value as timber, considered as ornamental, (*d*) young woods, and (*e*) coppice.

V. For an approved Report on the Plantations of which the competitor is Forester. Reporter to state the extent of plantations, the kinds of timber grown, soil, situation, age, management, etc. This is a standing subject. (*A Medal.*)

VI. For an approved Report on the Present State and Future Prospects of Arboriculture in the Counties of Aberdeen, Banff, Moray, and Nairn. (*A Medal.*)

VII. For an approved Report on the Forests of Germany. (*A Medal.*)

VIII. On the best Method of Procedure in growing a continuous Crop of Timber in Woods or Plantations. (*A Medal.*)

The Essay should deal with the different kinds of Woods, the ages, and proportion per acre of the trees at different stages, and whether these have been raised by natural or artificial means. Reference may be made to any system practised abroad which might prove applicable in this country.

IX. For an approved Essay on the best method of Rearing Plantations with the view of obtaining timber of a clean growth, fine quality, and high commercial value. (*A Medal.*)

The author must keep in mind the necessity of raising timber to successfully compete with the best quality of that imported from abroad.

X. For an approved Essay on the Recropping of Land with trees of the same Species. (*A Medal.*)

Special reference must be made to the growing of Larch after Larch, and the reporter should cite examples, describe the altitude and exposure, as well as the character of the soil, and also the time that elapsed after clearing before replanting took place.

XI. For an approved Report, based on results, on the advantage of Under Planting. (*A Medal.*)

XII. For an approved Essay on the best system of managing Coppice. (*A Medal.*)

XIII. For an approved Essay on the Thinning of Woods, viz.—Close *versus* Wide Thinning; the advantage of the one over the other as regards growth and quality of timber. (*A Medal.*)

XIV. For an approved Essay on the Larch Bug, *Chermes Laricis*. (*A Medal.*)

The writer must describe their life-history, the cause and effect of their presence, and any practical methods for their prevention and destruction, especially on large areas.

XV. For an approved Essay on the best method of Preventing the Inroads of the Pine Saw-fly—*Lophyrus pini* of Curtis. (*A Medal.*)

XVI. For an approved Essay on any Disease incidental to Forest Trees. A standing subject. (*A Medal.*)

XVII. For an approved Report on the most advantageous methods, not generally practised in this country, of Transporting Timber. (*A Medal.*)

The reporter specially to describe any means, other than by horse-power, of moving felled timber from the interior of woods to their margins, or to roads.

XVIII. For an approved Report, from personal observation, on the Management of Forests in any other country than Britain. (*A Medal.*)

Special reference to be made to appliances, modes of culture, and treatment not generally practised in this country.

XIX. For an approved Essay on the best methods of utilising Small-wood in the manufacture of Fancy-wood articles, Turnery, Wood Wool, etc. (*A Medal.*)

XX. For an approved Essay or Report on any other subject connected with Arboriculture. (*A Medal.*)

XXI. For an instrument or method for expeditiously obtaining the diameter of trees at a given height, or for any other useful invention or marked improvement on any of the implements used in Forestry. Models or implements to be accompanied by a report. (*A Medal.*)

CLASS II.—FOR ASSISTANT FORESTERS ONLY.

I. For an approved Essay on the Rearing of Natural and Artificial Undercover for Game, and the best methods of encouraging and regulating their growth. (*A Medal.*)

II. For an approved Report, based on personal observation, on the Propagation of Forest Trees and Shrubs. (*A Medal.*)

III. For an approved Essay on the best size of Plants, and Method of Planting, to produce the best results in different Soils and Situations. (*A Medal.*)

IV. For an approved Essay on the Peeling and Harvesting of different kinds of British Bark used in Tanning. (*A Medal.*)

V. For an approved Essay on the best method of protecting Trees from injury by Ground Game. (*A Medal.*)

VI. For an approved Essay on Pruning of Forest Trees. (*A Medal.*)

VII. For an approved Essay or Report on any other subject connected with Arboriculture. (*A Medal.*)

VIII. For the best and approved Model in Rustic, or Ornamental Woodwork, of any subject designed and executed by the competitor. Model not to exceed six feet in length. (*A Medal.*)

The Council invite the attention of young Foresters to the foregoing subjects, as they wish to encourage their literary efforts.

SPECIAL NOTICE.

The Introduction of New or Rare Trees.

Knowing the desirability of encouraging the introduction of New or Rare Plants, some Members of the Royal Scottish Arboricultural Society have resolved to offer a Prize for a Collection of not less than one thousand plants of each of the different varieties of Larch, raised from seeds obtained direct from trees growing in their native habitats. The Collection must include Russian, and especially Siberian Larch.

Those desiring to compete must enter their names before the 1st of May 1895, with the Secretary of the Royal Scottish Arboricultural Society, from whom particulars can be obtained of the conditions and rules of the Competition.

The special attention of Nurserymen is directed to this announcement.

Illustrations Fund.

The Council beg to direct special attention to this Fund, the object of which is to obtain contributions to defray the expense of illustrating the Society's *Transactions*.

The following donations have been received in 1894 :—

Mr D. F. Mackenzie, Mortonhall, Liberton, . .	£3	0	0
Mr J. K. Milne, Kevock Tower, Lasswade, . .	1	1	0
	£4	1	0

The Society's Album.

The Council wish it to be known that the Society has an Album for the Photographs of Members, and the Secretary will be glad to receive contributions.

ROBERT GALLOWAY,
Interim Secretary.

Royal Scottish Arboricultural Society.

Instituted 16th February 1854.

PATRON.

HER MOST GRACIOUS MAJESTY THE QUEEN.

The Forty-second Annual General Meeting of the Royal Scottish Arboricultural Society was held in the Large Room, No. 5 St Andrew Square, Edinburgh, on Wednesday, the 23rd day of January 1895, at 2 o'clock. R. C. Munro Ferguson, Esq. of Raith and Novar, President of the Society, presided.

Minutes Read.

Mr Robert Galloway, the Interim Secretary, read a Report by the Council containing a digest of the Minutes of the Meetings of the Council held since the last Annual General Meeting of the Society in August 1894, which was approved of.

Election of New Members.

The following sixty-five Candidates for Membership were duly elected:—

Abbot, Thomas, Forester, Firknowe, Peebles.
Anderson, Duncan, Assistant Forester, 12 Montague Street, Edinburgh.
Anderson, John G., Forester, Sutherland Estate, Dornoch.
Bannerman, John, Seedsman, of Messrs Morrison & Son, Elgin.
Bennet, J. B., C.E., A.M.I., 24 George Street, Edinburgh.
Bowie, James Alexander, Assistant Forester, Lilleshall, Newport, Salop.
Brown, Walter R., Assistant Forester, Bawdsey Manor, Woodbridge, Suffolk.
Bruce, Peter, Assistant Forester, Home Farm, Blair Athole.
Bruce, William, Assistant Forester, Murthly, Perthshire.
Callander, Henry, of Prestonhall, Dalkeith.

Campbell, Alexander, Assistant Forester, Murthly, Perthshire.
Carrick, Rev. Charles, B.D., The Manse, Newbattle.
Carruthers, Alex. Currie, Solicitor, 7 Howe Street, Edinburgh.
Chaplin, William, Assistant Forester, Dunrobin, Golspie.
Crozier, John, Forester, Dunrobin, Golspie.
Cruickshank, Allan Macdonald, 48 Castle Street, Edinburgh.
Cuthbert, James, Assistant Forester, Clova, Lumsden, Aberdeenshire.
Dick, Joseph, Forester, Wentworth, Rotherham, Yorkshire.
Dingwall, Alexander, Wine Merchant, Glendoig Villa, Perth.
Dingwall, George, Gardener, Belmont Castle, Meigle.
Drummond, David, Wholesale Stationer, 15 Victoria Street, Edinburgh.
Dundas, Captain Robert, Younger of Arniston, Kirkhill, Gorebridge.
Ferguson, John, Assistant Forester, Royal Botanic Garden, Edinburgh.
Fitzpatrick, James, Assistant Forester, Murthly, Perthshire.
Fraser, J. C., Nurseryman, Comely Bank, Edinburgh.
George, Alfred W., Land Agent, Tedbury Park, Tidenham, Chepstow.
Harrower, David K., Timber Merchant, Knowe Park, Bo'ness.
Hay, Sir John A., Bart. of Smithfield and Haystoun, Kingsmeadows, Peebles.
Hill, Claude, of Messrs John Hill & Sons, Spot Acre Nurseries, Stone, Staffordshire.
Hoare, Sir Henry Hugh Arthur, Bart. of Stourhead, Bath.
Innes, Alexander, Assistant Forester, Royal Botanic Garden, Edinburgh.
Jamieson, Andrew, Overseer, Carnbroe, Bellshill.
Laird, John, Assistant Forester, Bridgend Nursery, Liberton, Midlothian.
Laird, William, Forester, Fyvie Castle, Aberdeenshire.
Lyall, John, Land Steward, Pinkie, Musselburgh.
Macdonald, John, Assistant Forester, Dunrobin, Golspie.
M'Dougall, Robert Stewart, M.A., B.Sc., 9 Brougham Street, Edinburgh.
M'Harrie, Stair, Factor, Cranstoun Riddel, Dalkeith.
Macintosh, W. L., Gardener, Kingsmeadows, Peebles.
M'Kay, John, Assistant Forester, Dunrobin, Golspie.
Maclachlan, John, of Maclachlan, 12 Abercromby Place, Edinburgh.
Macmillan, John D., Assistant Forester, Royal Botanic Garden, Edinburgh.
Macnaughton, James, Gunmaker, 26 Hanover Street, Edinburgh.
M'Tavish, John, Assistant Forester, Dunrobin, Golspie.
Machray, Frank, Assistant Forester, Royal Botanic Garden, Edinburgh.
Margerison, Samuel, English Timber Merchant, Calverley, near Leeds.
Martin, David, Overseer to the Governors of the Fettes Trust, Fettes College.
Martin, Robert, Forester, Haystoun, Woodbine Cottage, Peebles.
Maxwell, James, Factor, Screel, Castle-Douglas.
Michie, James, Assistant Forester, Knowsley Prescott, Lancashire.
Milne, James, Gardener, etc., Whitslade, Broughton, Peeblesshire.
Munro, Donald, Assistant Forester, Bridgend Nursery, Liberton, Midlothian.

Murdoch, Graham W., Science and Naturalist Editor, *Yorkshire Weekly Post*, Milnthorpe, Westmorland.

Newton, George, Factor's Assistant, 28 Charlotte Square, Edinburgh.

Nicol, James, Assistant Forester, Bridgend Nursery, Liberton, Midlothian.

Priest, W., Gardener, Eglinton Castle, Irvine.

Reid, S., Forester, Bowmont Forest, Kelso.

Royle, James, Assistant Forester, Royal Botanic Garden, Edinburgh.

Sclater, Alexander, Seed Manager, 15 Princes Street, Edinburgh.

Smith, John, Cabinetmaker, Peebles.

Smith, Robert, Assistant Forester, Royal Botanic Garden, Edinburgh.

Terras, Alexander, Forester, Dalgetty Castle, Turiff.

Wight, Alexander, Overseer, Thurston, Innerwick.

Wighton, John, Forester, Newstead Abbey, Nottingham.

Williamson, John, Bank Agent, Loanhead.

Finances of the Society.

Mr George Mill, S.S.C., the Interim Treasurer, read a Report on the Financial Transactions for the past year, which showed a deficit of £12, 12s. 11d. The Report also showed that the nett funds of the Society at the close of the year amounted to £72, 18s. 9d., and the arrears of subscription to £69, 2s. Mr Ker moved, that a Committee be appointed to examine the Accounts of the Society and to report. Mr George Fraser moved, that the whole Accounts of the Society be remitted to an Auditor, to be afterwards appointed. Both motions were seconded, and on a vote being taken Mr Fraser's motion was carried.

Judges' Report.

Mr Alexander Milne, Convener of the Judges, read the following Report on the Essay, "On the Financial Results of the Cultivation of Woods," as revised by the author "Vigilantia."

"In their Report to the Annual General Meeting, held in August last, the Judges recommended that this Essay should be revised, and the calculations checked by the author. This has been done, and the Judges have now awarded a No. 2 Silver Medal. The author of the Essay is Mr George Cadell, Langley House, Surbiton, Surrey."

President's Address.

Mr R. C. Munro Ferguson, the President of the Society, then delivered an Address,[1] for which, on the motion of Professor Bayley Balfour, he was heartily thanked.

[1] A verbatim Report of the Address appears in the *Transactions*.

The Excursion of 1895.

Professor Somerville was called upon to explain the proposed arrangements in connection with the excursion to the Forests of North Germany. This he did by reading three letters received by him from Professor Schwappach of Eberswalde, in which three tours were outlined. The Professor recommended that the last of these tours, which would occupy about eight days from Hamburg, should be adopted. On the motion of Mr Dunn, Professor Somerville was thanked for the trouble he had taken, and the matter was remitted to the Council, with powers to make the necessary arrangements.

Professor Somerville's Address.

Professor Somerville afterwards delivered an Address[1] on the formation of a Company to acquire an estate for Sylviculture. Mr Slater, Haystoun, asked the meeting to award a vote of thanks to Professor Somerville for his Address, which was very heartily done.

Election of Office-Bearers.

The election of Office-Bearers was next proceeded with. On the motion of Mr Methven, the President was re-elected. Mr Dunn then said that as the Vice-Presidents and Members of Council had only been in office since August last, the Council recommended that they should be re-elected *en bloc*, and he accordingly moved their re-election.

Mr A. D. Richardson moved, that the Vice-Presidents and members of Council be not re-elected. The motion was duly seconded. Thereupon Mr Methven moved, that the Standing Orders be suspended, which was carried.

No other nominations having been made, Mr Dunn's motion was subsequently agreed to.

It was intimated that as Mr W. J. Moffat, the Secretary and Treasurer, had resigned, a Committee of the Council had reported upon the offices of Secretary and Treasurer, and had recommended that the offices should be combined as hitherto, and the salary

[1] A verbatim report of the Address appears in the *Transactions*.

continued for the present at £30. The Council submitted these recommendations to the meeting, and they were approved of. Applications for the appointment had been received from the following gentlemen, namely,—Messrs JOHN CRICHTON, 18 Princes Street; ROBERT GALLOWAY, 48 Castle Street, *Interim Secretary;* GEORGE MILL, S.S.C, 21 St Andrew Square, *Interim Treasurer;* EDWARD SANG, Solicitor, 29 Queen Street, who had subsequently withdrawn his application; A. WILLIAMSON, M.A., 2 Osborne Terrace; and JOHN NICOLL, Solicitor, 20 George Street.

The election was then proceeded with. Mr DUNN, Dalkeith, nominated Mr ROBERT GALLOWAY; Mr W. M. WELSH, Edinburgh, nominated Mr GEORGE MILL; and Mr WILLIAM CLARK, Edinburgh, nominated Mr JOHN NICOLL. Each nomination was duly seconded. A vote was first taken between Mr MILL and Mr NICOLL, which resulted in a majority in favour of Mr MILL. Thereafter a vote was taken between Mr MILL and Mr GALLOWAY, when it was found that Mr GALLOWAY had a majority of votes, and he was declared elected.

The Judges and Committee on *Transactions* were unanimously re-elected.

Mr JOHN ORD MACKENZIE, W.S., having resigned the appointment of Auditor, the following Candidates were nominated and seconded, namely,—Messrs SCOTT, C.A., Lauder Road, and JOHN T. WATSON, 16 St Andrew Square. On a vote being taken, Mr WATSON received a majority of votes, and was declared elected.

OFFICE-BEARERS.

The Office-Bearers elected for the year 1895 were therefore as follows:—

PRESIDENT.

R. C. MUNRO FERGUSON, M.P., of Raith and Novar, Raith House, Kirkcaldy, Fife.

VICE-PRESIDENTS.

JOHN METHVEN, Nurseryman, 15 Princes Street, Edinburgh.
HUGH CLEGHORN, M.D., LL.D., F.R.S.E., of Stravithie, St Andrews (*Died since Election*).
D. F. MACKENZIE, Factor, Mortonhall, Liberton.
ISAAC BAYLEY BALFOUR, Sc.D., M.D., F.L.S., Professor of Botany, Edinburgh.
JAMES MOFFAT, Assistant Factor, 48 Castle Street, Edinburgh.

COUNCIL.

Lewis Bayne, Forester, Scone, Perthshire.
Malcolm Dunn, The Palace Gardens, Dalkeith.
D. P. Laird, Nurseryman, Pinkhill, Murrayfield, Midlothian.
Andrew Slater, Overseer, Haystoun, Peebles.
Colonel F. Bailey, R.E., Lecturer on Forestry, Edinburgh University.
Robert Baxter, Forester, Dalkeith Park, Dalkeith.
Alexander Milne, Nurseryman and Seedsman, 32 Hanover Street, Edinburgh.
James Robertson, Wood Manager, Panmure, Carnoustie.
William Somerville, D.Œc., B.Sc., F.R.S.E., Professor of Agriculture and Forestry, Durham College of Science, Newcastle-on-Tyne.
Charles Buchanan, Overseer, Penicuik House, Penicuik.
John Clark, Forester, Haddo House, Aberdeen.
James Cook, Land Steward, Arniston, Gorebridge.
David Keir, Forester, Ladywell, Dunkeld.
George Mackinnon, The Gardens, Melville Castle, Lasswade.
W. M. Welsh, Nurseryman and Seedsman, 1 Waterloo Place, Edinburgh.

SECRETARY AND TREASURER.

Robert Galloway, 5 St Andrew Square, Edinburgh.

AUDITOR.

John T. Watson, 16 St Andrew Square, Edinburgh.

JUDGES.

Alexander Milne, 32 Hanover Street, Edinburgh (*Convener*).
Lewis Bayne, Jeannie Bank, Scone, Perth.
A. T. Williamson, 2 Osborne Terrace, Edinburgh.
D. P. Laird, Pinkhill, Murrayfield, Midlothian.
John Michie, Danzig, Balmoral.

COMMITTEE ON TRANSACTIONS.

Dr Cleghorn of Stravithie, St Andrews (*Convener*).
Professor I. Bayley Balfour, Edinburgh.
Malcolm Dunn, The Palace Gardens, Dalkeith.
Robert Lindsay, Curator, Royal Botanic Garden, Edinburgh.
John Methven, 15 Princes Street, Edinburgh.
Andrew Slater, Haystoun, Peebles.
William Somerville, Professor of Agriculture and Forestry, Durham College of Science, Newcastle-on-Tyne.

PHOTOGRAPHIC ARTIST.

Philip Cockburn, Dalkeith (*Resigned since Election*).

LOCAL SECRETARIES.

Scotland.

DANIEL DEWAR, Forester, Beaufort Castle, Beauly.
JAMES KAY, Forester, Bute Estate, Rothesay.
WILLIAM M'LEAN, Forester, Eglinton Castle, Irvine.
C. Y. MICHIE, Forester, Cullen House, Banffshire.
JOHN MICHIE, Forester, Balmoral, Ballater.
JAMES ROBERTSON, Forester, Panmure House, Carnoustie.
D. SCOTT, Forester, Darnaway Castle, Forres.

England.

JAMES BARTON, Forester, Hatfield, Herts.
JAMES BARRIE, Forester, Stevenstone Estate, Torrington, Devon.
ANDREW BOA, junior, Sub-Agent, Great Thurlow, Suffolk.
ROBERT T. COLLINS, Forester, Trentham, Stoke-on-Trent, Staffordshire.
JOHN DAVIDSON, *Secretary*, English Arboricultural Society, Haydon-Bridge-on-Tyne.
FRANK HULL, Forester, Lillieshall, Newport, Salop.
JAMES RUTHERFORD, Agent, Kirkleatham, Redcar, Yorkshire.
D. TAIT, Estate Bailiff, Owston Park, Doncaster, Yorks.

Ireland.

ROBERT COUPAR, Forester, Ashford, Cong, County Galway.

THE CHAIR OF FORESTRY.

A Statement of the Funds for the Endowment of the Chair of Forestry was submitted to the meeting, from which it appeared that there had been already handed to the University of Edinburgh £433, 10s., that the outstanding subscriptions amounted to £87, 6s., and that the balance in hand was £76, 10s.

PRESENTATIONS TO THE SOCIETY'S LIBRARY.

1. *Transactions of the Botanical Society*, Edinburgh, 1894.
2. *Proceedings and Transactions of the Nova Scotian Institute of Science*, second series, vol. i., part 3.
3. *Transactions of the Massachusetts Horticultural Society* for 1894, part i.
4. Various Reports from the Department of Agriculture, Victoria, Australia.
5. Leaflet on "Wireworms," from the Board of Agriculture, Britain.

Note.—Members may borrow from the Secretary any of the Books or Pamphlets belonging to the Society, provided they pay the cost of transmission, and guarantee their safe return within a reasonable time.

Notice of Motion.

The following Notice of Motion was given by Mr Andrew Slater, Haystoun, Peebles, in accordance with Fundamental Law XVI., and will fall to be discussed and disposed of at next Annual General Meeting:—

> That the name of the Society be altered from the Royal Scottish Arboricultural Society to the Royal Scottish Society of Forestry.

On the motion of Mr Welsh, a cordial vote of thanks was accorded to the Chairman for presiding.

Annual Dinner.

After the business meeting, the members dined together in the Royal British Hotel, under the Presidency of Professor Bayley Balfour. Mr Alex. Milne acted as croupier. The guests of the Society on the occasion were Judge Colston and Councillor R. M. Cameron. The usual loyal and patriotic toasts having been duly honoured, Judge Colston, in a felicitous speech, proposed the toast of the evening, "The Royal Scottish Arboricultural Society." The Croupier replied on behalf of the Society. Other appropriate toasts followed, and several songs were rendered by members of the company, which added much to the enjoyment of the evening.

A General Meeting of the Royal Scottish Arboricultural Society was held in No. 5 St Andrew Square, Edinburgh, on Friday, 26th July 1895, at 12 o'clock noon. John Methven, Esq., Senior Vice-President of the Society, presiding.

The Late Dr Cleghorn.

Before proceeding with the business of the Meeting, the Chairman referred in suitable terms to the valuable services rendered by the late Dr Cleghorn in the interests of Forestry, both at home and abroad, and especially in connection with the

Endowment of a Chair of Forestry in Edinburgh University, and moved that the Society record in their Minutes their sense of the great loss sustained by his death. The motion was seconded by Mr Dunn, and unanimously agreed to.

Minutes Read.

The Minute of the Forty-second Annual General Meeting of the Society, held on 23rd January last, was read and approved of.

Election of New Members.

The Election of the following twenty-six Candidates, whose names had previously been submitted to the Council, was duly confirmed, viz.:—

Boord, W. Bertram, Land Agent, Waterloo, East Witton, Middleham, Yorks.
Cameron, R. M., Architect, 24 George Street, Edinburgh.
Connor, George A., Factor, Craigielaw, Longniddry.
Cowan, Bernard, Superintendent, Harton Cemetery, South Shields.
Fyffe, Robert B., Land Steward, Lindertis, Kirriemuir.
Inglis, A. M., Nurseryman, Forres.
Johnston, Alex., Forester, Mount Teviot, Jedburgh.
Kirkwood, William, Assistant Forester, Mortonhall, Midlothian.
Laird, Robert, Nurseryman, 17a South Frederick Street, Edinburgh.
Mann, Charles, General Merchant, Lumsden, Aberdeenshire.
Mitchell, Alexander, Assistant Forester, Rosebery, Gorebridge.
Moncreiffe, Sir Robert D., Bart. of Moncreiffe, Perth.
Morgan, Malcolm, Assistant Wood Merchant, Comrie Street, Crieff.
Morrison, Hew, Librarian, Edinburgh Public Library.
Paxton, George, Richardland, Kilmarnock.
Philip, William Watt, Assistant Forester, Balmoral Castle, Aberdeenshire.
Robertson, Sir Henry, Pali Corwen, North Wales.
Robertson, Thomas, Forester, Knockboy, Piecess, County Galway.
Smith, Thomas, Overseer, The Lodge, Tring Park, Wigginton, Tring, Herts.
Stevens, Thomas, Solicitor and Land Agent, Lincoln's Inn Fields, London.
Tait, Wm. A., Factor, 13 Brandon Terrace, Edinburgh.
Tullo, James, 2 Hanover Street, Edinburgh.
Vert, Alex. C. D., S.S.C., 28 Frederick Street, Edinburgh.
Wardlaw, Adam, Eskgrove, Lasswade.
White, William, Farmer, Edgefield, Loanhead.
Wiseman, William, Nurseryman, Forres.

Election of a Vice-President and a Councillor.

On the motion of the Chairman, the recommendation of the Council that Dr Somerville be elected a Vice-President, in room of the late Dr Cleghorn, was unanimously agreed to. It was also unanimously agreed that Mr James Kay, Bute, be elected to the vacancy on the Council caused by the promotion of Dr Somerville.

Election of a Foreign Honorary Member.

Dr Somerville moved that, as recommended by the Council, Dr Adam Schwappach, Professor of Forestry, Eberswalde, Prussia, in consideration of his distinguished position as a Teacher of Forestry, his brilliant achievements as an investigator in Sylvicultural science, his valuable contributions to Forestal literature, and his great kindness in undertaking the necessary arrangements for the Society's Excursion to the Forests of North Germany, be elected a Foreign Honorary Member of the Society. The motion was cordially agreed to.

Essays and Awards.

Mr Alexander Milne, Convener of the Judges, then read the Report on the Essays, and the following Awards were made in accordance therewith,—the sealed envelope accompanying each Essay being opened by the Secretary, and the author's name announced to the Meeting.

Judges' Report.

The Judges appointed by the Council of the Royal Scottish Arboricultural Society have had under their consideration the merits of the several Essays sent in for competition by Members in 1895. They regret to say that only six Papers have been received this year. This is probably accounted for by the change of the date for receiving Essays, the date fixed this year having been much earlier than formerly. They beg to report as follows:—

Class I.

I. On the Pine Saw-Fly. (Motto, "Donside.") By Francis Berry, Forester, Colquoich, Inverkindie, Aberdeenshire.

The writer describes the ravages of this pest, and suggests a remedy. Award, No. 2 Silver Medal.

II. On the Best Method of Rearing Plantations with the view of obtaining Timber of a Clean Growth, Fine Quality, and High Commercial Value. (Motto "Exogenous.") By Alex. Murray, Forester, Murthly, Perthshire.

A fair descriptive essay. Award, No. 2 Silver Medal.

III. On the Best Method of Rearing Plantations with the view of obtaining Timber of a Clean Growth, Fine Quality, and High Commercial Value. (Motto, "Red Deal.") By A. C. Forbes, Bowood, Calne, Wiltshire.

A fair essay, judiciously treated. Award, No. 1 Silver Medal.

IV. Some Notes on the Physiology of Timber, Trees, and Shrubs, as shown by the Microscope. (Motto, "Liber.") By D. F. Mackenzie, Factor, Mortonhall, Midlothian.

A valuable collection of Plates, reflecting considerable credit on the author. Award, Gold Medal.

Class II.

I. On the Best Size of Plants and Method of Planting to Produce the Best Results. (Motto, "Treeplanter.") By James Rodger, Assistant Forester, New Scone, Perthshire.

A well-written paper, of some merit. Award, No. 2 Silver Medal.

II. On Peeling and Harvesting of Different Kinds of British Barks used in Tanning. (Motto, "Rob Roy.") By William Forgan, Assistant Forester, Rose Cottage, New Scone, Perthshire.

Award, Bronze Medal, to encourage a beginner.

Mr D. F. Mackenzie intimated that he desired the Society to accept the Cabinet of Photo-Micrographic Slides illustrative of Plant Physiology which accompanied his essay. The Chairman, on behalf of the Society, warmly thanked Mr Mackenzie for his gift.

Excursion in 1896.

The Chairman, on behalf of the Council, suggested that the districts of Stirling and Callander should be visited next year, and there being no other suggestion, the matter was remitted to the Council, with powers.

Library and Museum.

On behalf of the Library Committee, Dr Somerville reported that, in terms of a promise contained in a Memorial presented by the Society to the First Commissioner of Works on 12th March 1881, that the Library and Collection of Forest Specimens and Produce belonging to the Society would be deposited for public exhibition and instruction in the event of the establishment of a School of Forestry in Edinburgh Arboretum, the Committee had handed over to the Curator of the Royal Botanic Garden the specimens and such of the Books as were not already in the Library there, on the condition that the articles should be marked as having been presented by the Society; he also reported that a list of the Articles presented had been put up with the Society's papers.

Presentations to the Society's Library.

The Secretary reported that the following presentations had been made since the Annual General Meeting in January last :—

1. Lecture on Fibres from Plants, by William R. Guilfoyle, Director of the Melbourne Botanical Gardens. From the Department of Agriculture, Victoria.
2. Schedule of Prizes and Programme from the Massachusetts Horticultural Society.
3. *Transactions of English Arboricultural Society*, 1893-94.
4. *Society of Arts Journal*, of 21st December 1894, containing an article on Forestry by General Michael.
5. *Transactions of Surveyor's Institution*, parts 10 and 11 of vol. xxvii., containing a paper on Forestry by George Cadell.
6. Report by Secretary for Agriculture, Nova Scotia, 1894.
7. Report on State Forest Administration, South Australia, 1893-94.

8. Report by Messrs Rowe and Kelly on Prospects of Trade with India, China, Japan, etc., for Dairy, etc., products. Department of Agriculture, Victoria.
9. Forest Department of Madras Report, 1893-94.
10. *Catalogue of Forestry Collection of the Surveyor's Institution*, 2nd edition, 1895.
11. Board of Agriculture Returns, 1894.
12. Various Leaflets from Board of Agriculture, Britain.
13. Report of Smithsonian Institution, Washington, for 1893.
14. Cabinet containing Photo-Micrographic Slides illustrative of Plant Physiology, from D. F. Mackenzie, Factor, Mortonhall.

It was remitted to the Council to take such steps as they might deem advisable for making the books still in the Library, and also those which may hereafter be presented, available to the members for reference.

Note.—Members may borrow from the Secretary any of the Books or Pamphlets belonging to the Society, provided they pay the cost of transmission, and guarantee their safe return within a reasonable time.

Notice of Motion.

Mr Dunn gave notice, on behalf of the Council, that at the next Annual General Meeting, a motion for the revision of the Laws of the Society would be submitted.

Paper on German Forestry.

Mr John Michie, Forester to Her Majesty the Queen at Balmoral, then read a very interesting and instructive paper, giving his impressions of German Forestry in the Thüringer-Wald.[1]

Votes of Thanks.

Very hearty votes of thanks were accorded to Mr Michie for his paper; to Mr Munro Ferguson, President of the Society, for his valuable services in connection with the arrangements for the Excursion of the Society to Germany; and to the Chairman for presiding.

[1] The paper appears in the *Transactions*.

IN COUNCIL.

Illustrations Fund.

The Council beg to direct special attention to this Fund, the object of which is to obtain contributions to defray the expense of illustrating the Society's *Transactions.*

The Society's Album.

The Council wish it to be known that the Society has an Album for the Photographs of Members, and the Secretary will be glad to receive contributions.

Members are invited to read short practical papers on any subject connected with Forestry at the Annual General Meeting in January, or at the General Meeting to be held at the time of the Excursion. Those who intend to do so are requested to intimate, in writing, the Title of their subject to the Secretary, not later than 16th December 1895 or 1st June 1896; stating the time they may require for reading the paper.

SYLLABUS.

The following subjects are offered for competition in 1896 :—

[*The Judges are empowered to fix the value of the Prizes to be awarded according to the respective merits of the Essays.*

All Essays and Reports intended for Competition must be lodged with the Secretary not later than 1st June 1896. All Collections of Cones, Seeds, and Rustic Work must be in the hands of the Secretary not less than three days before the Annual General Meeting, to be held on 29th January 1896. Each Essay, Report, Collection, or Article must bear a Motto, *and be accompanied by a sealed envelope bearing outside the* same Motto, *and the Class to which the Competitor belongs, and containing inside, a* Card *with the* Name *and* Address *of the Competitor.*

Judges cannot compete during their term of office.

Successful Competitors may either have the medals or their converted values, which are as follows:—Gold, £5; No. 1 *Silver,* £3; No. 2 *Silver,* £2; *Bronze,* 10s.]

Class I.—For Open Competition.

I. For an approved Report showing the Financial Results of the Cultivation of Woods and Plantations. (*Ten Guineas* offered by Isaac Bayley Balfour, M.D., D.Sc., Professor of Botany in the University of Edinburgh, formerly President of the Society.)

It is not necessary that the names of the estates on which the woods grow should be published, but the reporter must give the annual value of the land previous to planting; statistics of the cost of forming the plantations, including draining and fencing; the expenses of management, the income derived, and the present value of the Woods.

II. For an approved Report detailing the methods employed to bring about the Natural Regeneration of a Wood, and the subsequent Treatment as regards Artificial Assistance, should such have been rendered necessary owing to the Natural Sowing having been irregular, insufficient, or too dense. (*A Medal.*)

The author must cite some particular case, and give the results of a systematic attempt at natural regeneration, bearing in mind the fact that a patchy imperfect restocking cannot be regarded as satisfactory or successful.

III. For an approved Essay on the best methods of Pruning Avenue and Park and Forest Trees, keeping in view the production of timber and the landscape effect; also on the best methods for renovating old Park Trees. (*Silver Medal* offered by Wm. M. Welsh, Esq., of Messrs Dicksons & Co., 1 Waterloo Place, Edinburgh.)

IV. For an approved Essay on the Valuation of Woods or Plantations for the purpose of Transfer. (*A Medal.*)

The writer to describe the method (*a*) of valuing matured woods, (*b*) middle-aged woods, (*c*) park trees and others that may be, in addition to their value as timber, considered as ornamental, (*d*) young woods, and (*e*) coppice.

V. For an approved Report on the Plantations of which the competitor is Forester. Reporter to state the extent of plantations, the kinds of timber grown, soil, situation, age, management, etc. This is a standing subject. (*A Medal.*)

VI. For an approved Report on the Present State and Future Prospects of Arboriculture in the Counties of Dumbarton, Perth, and Stirling. (*A Medal.*)

VII. On the best Method of Procedure in growing a continuous Crop of Timber in Woods or Plantations. (*A Medal.*)

The Essay should deal with the different kinds of Woods, the ages, and proportion per acre of the trees at different stages, and whether these have been raised by natural or artificial means. Reference may be made to any system practised abroad which might prove applicable in this country.

VIII. For an approved Essay on the Recropping of Land with trees of the same Species. (*A Medal.*)

Special reference must be made to the growing of Larch after Larch, and the reporter should cite examples, describe the altitude and exposure, as well as the character of the soil, and also the time that elapsed after clearing before replanting took place.

IX. For an approved Report, based on results, on the advantage of Under Planting. (*A Medal.*)

X. For an approved Essay on the most remunerative systems of managing Coppice. (*A Medal.*)

XI. For an approved Essay on the Thinning of Woods, viz.—Close *versus* Wide Thinning; the advantage of the one over the other as regards growth and quality of timber. (*A Medal.*)

XII. For an approved Essay on the best method of Preventing the Inroads of the Pine Saw-fly—*Lophyrus pini* of Curtis. (*A Medal.*)

XIII. For an approved Essay on any Disease incidental to Forest Trees. A standing subject. (*A Medal.*)

XIV. For an approved Report on the most advantageous methods, not generally practised in this country, of Transporting Timber. (*A Medal.*)

The reporter specially to describe any means, other than by horse-power, of moving felled timber from the interior of woods to their margins, or to roads.

XV. For an approved Essay on the best methods of utilising Small-wood in the manufacture of Fancy-wood articles, Turnery, Wood Wool, etc. (*A Medal.*)

XVI. For an approved Essay or Report on any other subject connected with Arboriculture. (*A Medal.*)

XVII. For an instrument or method for expeditiously obtaining the diameter of trees at a given height, or for any other useful invention or marked improvement on any of the implements used in Forestry. Models or implements to be accompanied by a report. (*A Medal.*)

Class II.—For Assistant Foresters only.

I. For an approved Essay on the Rearing of Natural and Artificial Undercover for Game, and the best methods of encouraging and regulating their growth. (*A Medal.*)

II. For an approved Report, based on personal observation, on the Propagation of Forest Trees and Shrubs. (*A Medal.*)

III. For an approved Report, based on personal observation, on any disease affecting Trees, or injuries caused to Trees, by insects or animals. (*A Medal.*)

IV. For an approved Essay on the Peeling and Harvesting of different kinds of British Bark used in Tanning. (*A Medal.*)

V. For an approved Essay on the best method of protecting Trees from injury by Ground Game. (*A Medal.*)

VI. For an approved Essay on Pruning of Forest Trees. (*A Medal.*)

VII. For an approved Essay or Report on any other subject connected with Arboriculture. (*A Medal.*)

VIII. For the best and approved Model in Rustic, or Ornamental Woodwork, of any subject designed and executed by the competitor. Model not to exceed six feet in length. (*A Medal.*)

The Council invite the attention of young Foresters to the foregoing subjects, as they wish to encourage their literary efforts.

ROBERT GALLOWAY,
Secretary.

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MUTUAL LIFE ASSURANCE

THE SCOTTISH PROVIDENT INSTITUTION

SEVENTH SEPTENNIAL INVESTIGATION
WITH
DIVISION OF PROFITS

57th Annual Report
1895

SUMMARY OF REPORT

SUBMITTED TO THE

57th ANNUAL GENERAL MEETING, on 24th April 1895.

THE DIRECTORS have satisfaction in submitting the following REPORT which, in addition to the usual Statement of the Business of the past year, gives the Results of the 7th SEPTENNIAL INVESTIGATION with DIVISION OF SURPLUS.

PROPOSALS received **£1,700,169.** NEW ASSURANCES completed **£1,468,659.**

This is the largest New Business in any one year, and includes several Policies for large amounts effected as a provision for Death Duties—a purpose for which the distinctive system of the Institution is being recognised as specially suitable.

TOTAL PREMIUMS of the year, **£662,450.**

TOTAL INCOME, including Interest, **£1,027,942.**

The CLAIMS, including Bonus Additions,* were **£464,686.**

* *These averaged 50 per cent on the Assurances which participated.*

The REALISED FUNDS amounted at 31st DEC. 1894 to **£9,043,193,**
Or, deducting Claims etc. outstanding, to **£8,949,754,**
the Increase during the year being the large sum of **£413,453.**

THE PROGRESS of the INSTITUTION

In each SEPTENNIAL PERIOD is shown in the following TABLE.

IN PERIODS ENDING 31ST DECEMBER.	TOTAL ASSURANCES EFFECTED.	FUNDS AT END OF PERIOD.	SURPLUS.		INCOME IN LAST YEAR OF PERIOD.
			NO. OF PARTICIPANTS.	AMOUNT.	
1845 (8 years)	£942,899	£69,009	..	..	£25,366
1852	2,571,328	254,675	167	£26,159	68,607
1859	4,590,300	633,514	851	79,644	120,625
1866	7,525,373	1,245,372	2,492	181,544	205,358
1873	12,297,445	2,253,175	4,599	376,577	353,613
1880	19,695,470	3,913,252	6,662	624,473	566,441
1887	26,837,043	6,179,746	9,384	1,051,035	783,675
1894	**34,990,385**	**9,043,194**	**13,220**	**1,423,018**	**1,027,942**

During the Septennial Period ending 31st December last the NEW ASSURANCES completed amounted to £8,153,342; the ratio of EXPENSES to Premiums averaged only about 10½ per cent—an exceptionally favourable ratio, more particularly in view of the fact that it is calculated upon the Institution's low premiums. The REALISED FUNDS increased from £6,179,746 to £9,043,194; and the rate of INTEREST earned was maintained at over 4¼ per cent.

The CLAIMS paid during the same period were £2,805,065, and, both in number and amount, were greatly under the expectation—having been about four-fifths of the estimate based on the "Actuaries' Experience H^M" Table on which the calculations proceed. More than one-half of the Members who died were entitled to Bonuses which, notwithstanding that the premiums do not as a rule exceed the non-profit rates of other Offices, were on the average equal to an addition of about **50** per cent to the Policies which participated.

SEPTENNIAL INVESTIGATION.

In estimating the Liabilities the "Actuaries' Experience H^M" Table has again been employed, the entire loading having been thrown off and excluded from the calculations, with an additional reserve in respect of Assurances effected by single payment or by terminable premiums. At all previous Investigations *interest* at the rate of 4 per cent was assumed in the calculations; but, in view of the general tendency towards a reduction in the earning power of money on first class securities, the Directors are of opinion that $3\frac{1}{2}$ per cent forecasts now the probabilities of the future as accurately as 4 per cent did in former years; and the present Valuations have accordingly proceeded upon a $3\frac{1}{2}$ per cent basis. The rate actually earned throughout the Septennium has exceeded $4\frac{1}{4}$ per cent. It is gratifying that this important change can be effected without materially diminishing the shares of Surplus as compared with previous divisions. In connection with this change, it should not be lost sight of that various additional privileges have been conferred on the Members during the past Septennium, viz. the payment of Intermediate Bonuses, the payment of Claims immediately on proof of death, and the cessation after five years of extra premiums for foreign residence.

The SURPLUS resulting from the Valuation amounts to . . .	£1,423,018
from which there falls to be deducted the amount already paid as Intermediate Bonuses	60,832
	£1,362,186
Of this sum it is recommended that there be reserved for future division	391,796
Leaving to be now apportioned in terms of the Laws . . .	£970,390

The number of Policies entitled to participate, either immediately or prospectively in the next seven years, is 13,220, among which the above sum of £970,390 falls to be divided.

HISTORY AND CONSTITUTION.

THE SCOTTISH PROVIDENT INSTITUTION was established in 1837, with the object of giving to the ASSURED the full benefit of the LOW PREMIUMS hitherto confined to a few of the PROPRIETARY OFFICES, while at the same time retaining the WHOLE SURPLUS for the Policyholders.

THE RATES OF PREMIUM are so moderate that at most ages an assurance of £1200 to £1250 may be secured for the same yearly premium which would generally elsewhere assure (with profits) £1000 only—the difference of £200 or £250 being equivalent to

An Immediate and Certain Bonus of 20 to 25 per cent.

THE WHOLE SURPLUS goes to the Policyholders on a system at once safe, equitable, and favourable to good lives—no share being given to those by whose early death there is a *loss* to the Common Fund.

The System is found to be specially suited for Family Settlements, *securing at a low cost the largest Assurance to cover the period when such a provision is generally most needed; while the* Whole Surplus *is eventually returned to those who prove good lives.*

HEAD OFFICE: 6 ST. ANDREW SQUARE, EDINBURGH.

May 1895.

Scottish Provident Institution.

TABLE OF PREMIUMS, BY DIFFERENT MODES OF PAYMENT,

For Assurance of £100 at Death—With Profits.

Age next Birthday.	Annual Premium payable during Life.	ANNUAL PREMIUM LIMITED TO			Single Payment.	Age next Birthday.
		Twenty-one Payments.	Fourteen Payments.	Seven Payments.		
21	£1 16 3	£2 10 6	£3 4 11	£5 10 0	£33 0 1	21
22	1 16 9	2 11 0	3 5 9	5 11 0	33 5 10	22
23	1 17 2	2 11 6	3 6 5	5 12 1	33 11 2	23
24	1 17 7	2 12 1	3 6 11	5 13 1	33 16 5	24
25	1 18 0	2 12 6	3 7 3	5 14 0	34 2 0	25
26	1 18 6	2 13 0	3 7 10	5 14 11	34 8 2	26
27	1 19 2	2 13 6	3 8 7	5 15 11	34 16 1	27
28	1 19 11	2 14 1	3 9 5	5 17 1	35 4 9	28
29	2 0 8	2 14 8	3 10 3	5 18 6	35 14 1	29
*30	2 1 6	2 15 4	3 11 2	6 0 1	36 4 0	*30
31	2 2 6	2 16 2	3 12 1	6 1 10	36 14 6	31
32	2 3 5	2 17 1	3 13 2	6 3 8	37 5 5	32
33	2 4 6	2 18 0	3 14 4	6 5 8	37 17 2	33
34	2 5 7	2 19 0	3 15 7	6 7 9	38 9 7	34
35	2 6 10	3 0 2	3 16 11	6 10 0	39 2 9	35
36	2 8 2	3 1 5	3 18 4	6 12 5	39 16 11	36
37	2 9 8	3 2 9	3 19 11	6 15 0	40 12 4	37
38	2 11 3	3 4 3	4 1 7	6 17 9	41 8 7	38
39	2 12 11	3 5 9	4 3 4	7 0 7	42 5 4	39
†40	2 14 9	3 7 5	4 5 2	7 3 7	43 2 10	†40
41	2 16 8	3 9 2	4 7 2	7 6 8	44 0 11	41
42	2 18 8	3 11 1	4 9 3	7 9 11	44 19 9	42
43	3 0 11	3 13 1	4 11 5	7 13 3	45 19 3	43
44	3 3 3	3 15 3	4 13 10	7 16 9	46 19 7	44
45	3 5 9	3 17 6	4 16 4	8 0 7	48 0 8	45
46	3 8 5	4 0 0	4 19 1	8 4 6	49 2 8	46
47	3 11 5	4 2 8	5 2 1	8 8 8	50 5 8	47
48	3 14 8	4 5 8	5 5 4	8 13 2	51 9 7	48
49	3 18 1	4 8 9	5 8 9	8 17 11	52 14 1	49
50	4 1 7	4 12 1	5 12 4	9 2 10	53 19 3	50
51	4 5 6	4 15 5	5 16 1	9 7 11	55 4 5	51
52	4 9 5	4 18 10	5 19 11	9 13 1	56 9 0	52
53	4 13 5	5 2 5	6 3 11	9 18 3	57 12 11	53
54	4 17 8	5 6 3	6 8 0	10 3 5	58 17 2	54
55	5 1 11	5 10 2	6 12 1	10 8 6	60 0 8	55

[The usual *non-participating* Rates of other Offices differ little from these Premiums.]

* A person of 30 may secure £1000 at death, by a yearly payment, *during life*, of £20 : 15s.
This Premium would generally elsewhere secure **£800** only, instead of **£1000.**
OR, he may secure £1000 by 21 yearly payments of £27 : 13 : 4—*being thus free of payment after age* 50.

† At age 40, the Premium *ceasing at age* 60 is, for £1000, £33 : 14 : 2,—about the same as most Offices require during the whole term of life. Before the Premiums have ceased, the Policy will have shared in at least one division of surplus. To Professional Men and others, whose income is dependent on continuance of health, the limited payment system is specially recommended.

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BRISTOL, 31 Clare Street.
CARDIFF, 19 High Street.
LEEDS, 35 Park Row.
LIVERPOOL, 25 Castle Street.
MANCHESTER, 10 Albert Sq.
NEWCASTLE, 1 Queen Street.
NOTTINGHAM, 27 Victoria St.
BELFAST, 10 Donegall Sq., N.

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